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Ninth Report of the Variable Star Section, 1910–1914.

(C. L. Brook, M.A., F.R.A.S., Director.)

SECTION FOR THE OBSERVATION

OF

VARIABLE STARS.

DIRECTOR—C. L. BROOK, M.A., F.R.A.S.

REPORT OF THE SECTION, 1910–1914.

PREFACE.

In this branch of Astronomy perhaps the most important conclusion arrived at, since the publication of Volume XVIII. of the Memoirs of the Association, is the necessity of continuous work on individual stars. The paper contributed by our past President, the Rev. T. E. R. Phillips, to the "Monthly Notices of the R.A.S.," LXXV., p. 557, is evidence of this; the particular star there discussed happens to have been watched steadily by various observers for about sixty years; without this continuity the valuable results deduced therein could not have been obtained: in fact, even this long period is insufficient completely to solve the problem.

Further, if the papers recently published by Professor H. H. Turner and Miss Blagg on the observations of Baxendell, sen., be consulted, it will be seen that the gaps in the work and the *comparatively* short period over which it extends prevent in some cases the value of the observations from being fully realised; other instances might be adduced, and it is not too much to say that without continuity (particularly in Long Period Variables) the progress of our knowledge will be very slow.

No apology, therefore, is needed for the presentation of this volume, which contains the work of the section, continued on much the same plan as before, for the years 1910–1914. The aim and object of all variable star observers should be steadily to watch such stars as may be taken up, but not to attempt more than can be adequately observed, thus producing a body of work which will continually increase in value and which will

eventually be of great importance. A band of observers, such as our section consists of, is peculiarly fitted to attain this object; its personnel must necessarily change, but the corporate body remains, and it should be the special care of its directors and members, both present and future, to preserve the continuity of the work.

Earlier observers usually adopted the method of comparing independently the variable with several surrounding stars: this is known as Argelander's method, and with certain precautions is very accurate; but recently what is termed the fractional or interpolation method has come into favour; here the variable is compared with two stars, one brighter and one fainter, and the magnitude is deduced from the relative sequence of the brightness of the three stars, the magnitudes of two of which are known. This method has one disadvantage, namely, that it does not provide material for adjusting the assumed magnitudes of the comparison stars, as Professor Turner did when discussing Sir Cuthbert Peek's observations in the "Memoirs of the R.A.S.," Vol. LV.; it has, however, the advantage that the work of comparison can be done with almost equal accuracy and much more quickly, but it is obvious that it depends on having standard lists of magnitudes; these have been provided by the Harvard College Observatory for a large number of variables, are extensively used, and there is no exaggeration in saying that they form the most important help to observers yet undertaken, and that without them the work would be much more laborious and consequently the output much reduced. But valuable and accurate as these lists are, the Director and some of his associates agree in thinking that they could be improved and, though with considerable trepidation, would like to suggest to Professor Pickering that a careful revision would do more than almost any other work in this branch of astronomy to improve the quality of future observations. The Director might allude to several practical points in observing variables, such, for instance, as the effect of what may be called position-angle on the estimate of comparative brightness; whether, in making a comparison, the eye should glance backwards and forwards from one star to another, or should attempt to see both at once, or whether, in the case of red stars, a better estimate can be made by a prolonged stare or a hasty glance; he will here draw particular attention to one point only, which those who have no practical acquaintance with stellar fields may consider almost superfluous to mention, but which is perhaps the most important of all, viz., the *certainty* of correct identification.

An observer, when first taking up the work, recognises the importance of this, but does not so clearly realise the ease with which a mistake may be made, especially if the instrument is too small to carry him through the minimum of the variable. As the star gradually gets near the limit of vision it not infrequently happens that, when it really disappears, the observer switches on to some other star in the immediate vicinity, and only when the variable becomes again sufficiently bright to be seen, and sometimes not even then, does he find that he has

been observing the wrong star. The Director could point out several instances of this not solely in the work of the V.S.S.

To avoid this error a beginner should start work with a few variables only, should take great trouble in identifying the stars from the chart, especially taking note of certain lines and angles (for just as the eye with practice can detect very small differences in light, so it can also detect very small differences in allineation), and should observe the star very frequently ; he will then find that gradually a picture of the immediate vicinity of the variable is mentally formed (just as a blindfold chess player can visualise the position of a game), and he will be able (also like a blindfold player) to dismiss the picture of one field from his mind and call up the next. A considerable number of fields can thus be retained in the mind's eye, and it will be found that not only is accuracy of identification secured, but also rapidity of observation.

The observations printed in this volume number 16,217 ; of these 360 (R Geminorum, R Hydræ, and S Virginis) belong to the period 1905–1909, leaving 15,857 taken during the five years 1910–1914, or an average of 547 per star, as compared with 600 per star in the former period. About 15 per cent. of the actual observations sent in have been rejected, a few because they were certainly erroneous, a larger number owing to the record being "not seen" or "invisible" at a time when the star was being followed by more powerful instruments, but chiefly owing to redundancy, *i.e.* when the same observer repeated the same result for several days nearly in succession ; such observations cause waste of time and add little to the value of the record. The point here arises, how many observations are required to give a really satisfactory record of a star's history ? To this no definite answer can be given ; some stars are only visible for part of the year, and some vary very slowly ; the necessity for very frequent observation is not so apparent in the latter case as where a star has a short period and a large range. In the view of the Director about one hundred observations per annum may be considered sufficient, but owing to the tendency to observe more frequently at maxima, and the importance of continuity, this should form the lower limit.

The securing of a suitable distribution of observations among the various stars is another point of difficulty ; members usually prefer to choose for themselves, and the smaller instruments, which are in the majority, naturally gravitate to the stars with brighter minima. Something may be done by suggesting to new observers stars which are insufficiently observed, but in an amateur body great freedom must be allowed or the work will suffer.

Arising out of the above considerations is the question of a considerable increase in the work of the section. Since the end of the period embraced in Vol. XVIII. ten more stars have been added to the list, of which five are included in this volume ; a few more are in contemplation, but any large increase must depend on the number and assiduity of the members, and the section would then require more than one director. The gradual

increase of the work is most desirable, but of more importance still is the continuity of the observations and their sufficient supervision.

Table A gives the names of the contributors, the usual place of observation, the abbreviation adopted, and the telescope used.

TABLE A.

Observer.	Address.	Designation.	Instruments.
H. B. Adames	Ilford	Ad.	4-in. O.G.
T. W. Backhouse	Sunderland	Bk.	$4\frac{1}{4}$-in. O.G.
J. Van der Bilt	Utrecht	Bl.	10-in. and 3-in. O.G.
J. T. Bird (Rev.)	South Africa	Bd.	3-in. O.G.
E. G. Bird (the late)	Canada	Bi.	$8\frac{1}{2}$-in. spec.
J. Boujon	Amiens	Bo.	4-in. O.G.
C. L. Brook	Meltham	Br.	10-in. spec.
R. M. Brook (Mrs.)	Weybridge	R.B.	Binoculars.
A. N. Brown	New Barnet	Bn.	5-in. and 3-in. O.G.
F. G. Brown	London	F.G.B.	$12\frac{1}{2}$-in. spec.
A. B. Burbeck	U.S.A.	Bc.	3-in. O.G.
C. F. Butterworth	Poynton	Bh.	6-in. O.G. and $10\frac{1}{4}$-in. spec.
E. K. Church (Miss)	Ashstead	Ch.	9-in. spec.
F. R. Cripps	London	Cr.	$4\frac{1}{2}$-in. O.G.
H. L. Dilks	Manchester	Dk.	3-in. O.G.
W. T. Gayfer	Cleethorpes	Ga.	3-in. O.G.
M. E. J. Gheury	London	Gh.	$3\frac{1}{2}$-in. O.G.
N. V. Ginori	Italy	Gi.	$2\frac{5}{8}$-in. O.G.
A. W. Goatcher	South Africa	Go.	3-in. O.G.
J. A. Greenwood	Chichester	Gd.	8-in. O.G.
E. J. How (Rev.)	Walsall	Hw.	$3\frac{1}{2}$-in. O.G.
G. B. Lacchini	Italy	La.	$2\frac{3}{4}$-in. O.G.
J. G. Lincoln	Walton	Ln.	4-in. O.G.
S. Manning	Australia	Mg.	Binoculars.
E. E. Markwick	Bournemouth	Ma.	$8\frac{1}{2}$-in. spec.
A. A. Nijland (Prof.)	Utrecht	Ni.	10-in. and 3-in. O.G.
F. de Roy	Antwerp	D.R.	8-in. spec.
P. M. Ryves	Zaragoza	Ry.	3-in. O.G.
A. Thom	Dunlop	Tm.	3-in. O.G.
H. Thomson	Newcastle	Th.	$12\frac{1}{2}$-in. spec.
F. C. Thomson	Glasgow	Tn.	9-in. spec.
C. Walmsley	Manchester	Wa.	3-in. O.G.
C. J. Westland	New Zealand	Wd.	4-in. O.G.
W. M. Worssell	Johannesburg	Wl.	4-in. and 9-in. O.G.

Next follows a table showing the distribution of the work among the observers and the amount done on each star separately.

TABLE B.

Stars, Observers, and Observations, 1910–1914.

Star.	Ad.	Bk.	Bl.	Bd.	Bi.	Bo.	Br.	R.B.	Bn.	F.G.B.	Bc.	Bh.	Ch.	Cr.	Dk.	Ga.	Gh.	Gi.	Go.	Gd.	Hw.	La.	Ln.	Mg.	Ma.	Ni.	D.R.	Ry.	Tm.	Th.	Tn.	Wa.	Wd.	Wl.	Total.
R Andromedæ	..	..	..	30	..	..	86	..	47	36	4	99	6	..	..	..	..	..	..	..	..	11	..	..	15	..	..	..	..	67	..	..	..	..	401
R Arietis	..	..	..	..	..	10	78	..	91	..	6	..	..	..	..	..	..	..	..	1	..	..	..	..	20	148	..	..	..	..	48	..	..	..	402
W Andromedæ	..	..	..	..	3	..	54	..	26	24	..	..	..	..	..	3	..	..	..	..	..	..	..	..	2	127	..	..	..	23	..	..	..	..	262
o (Mira) Ceti	..	3	..	45	..	2	62	..	43	..	10	39	..	..	..	4	..	85	23	..	35	88	..	..	18	287	..	..	..	6	..	..	62	..	812
R Aurigæ	6	..	..	..	2	14	99	..	75	42	..	..	12	6	..	..	25	..	..	..	38	..	..	..	45	130	..	..	..	58	34	..	..	..	586
U Orionis	..	..	..	..	..	..	75	..	36	..	2	121	..	5	2	..	7	37	..	..	8	24	..	..	33	..	..	..	..	35	..	..	..	..	385
X Aurigæ	..	..	..	..	2	..	75	..	22	31	2	196	..	..	..	..	..	..	..	..	..	6	..	..	9	159	..	..	..	..	..	..	..	..	502
R Geminorum	..	..	..	..	..	..	92	..	92	18	..	135	11	..	..	..	11	..	..	2	..	..	..	..	24	..	18	..	..	29	..	..	..	..	432
R Leonis	..	..	65	57	..	46	72	5	75	..	10	131	..	15	..	19	13	73	40	..	4	108	5	..	36	..	..	..	..	..	..	..	27	..	801
R Ursæ Majoris	..	..	..	..	..	25	..	..	147	..	11	134	..	7	..	..	..	..	..	1	..	80	..	..	46	153	..	..	13	..	..	..	..	..	617
T Ursæ Majoris	..	..	..	..	..	31	102	..	138	50	12	..	..	11	..	..	..	..	..	1	..	31	..	..	36	156	..	..	..	41	21	..	..	..	630
S Ursæ Majoris	..	..	..	..	..	38	104	..	163	..	..	..	..	11	..	..	..	29	..	1	21	101	..	..	41	164	..	..	..	..	..	..	..	..	673
R Hydræ	..	..	..	12	..	..	1	..	36	..	7	..	..	..	..	4	..	32	43	3	..	74	..	26	17	..	2	40	..	..	..	..	101	24	422
S Virginis	..	..	..	..	..	..	1	..	68	..	5	58	..	..	..	..	..	..	19	5	..	55	..	..	21	..	..	81	..	1	..	..	23	..	337
V Boötis	..	..	94	..	20	46	60	..	80	..	..	200	..	9	..	..	23	64	..	..	..	100	28	..	4	..	..	..	..	..	46	19	..	..	793
R Boötis	..	..	81	..	..	15	1	..	129	20	7	194	..	3	..	11	..	7	..	1	..	77	..	..	40	..	..	..	..	..	..	..	..	..	586
S Coronæ	..	..	..	19	..	..	88	..	114	24	5	79	16	10	..	..	31	..	..	1	..	9	..	..	51	156	..	..	..	..	..	..	..	..	603
S Ursæ Minoris	..	..	..	..	14	36	4	..	68	..	..	128	..	14	..	..	42	54	..	..	35	102	..	..	19	..	..	..	..	..	..	..	..	..	516
R Serpentis	..	..	28	..	..	..	75	..	128	..	9	85	..	17	..	43	35	..	..	2	..	..	..	..	53	..	..	..	7	27	17	5	..	..	531
R Draconis	..	..	..	..	..	37	98	..	147	..	10	..	..	3	..	..	..	..	..	2	14	39	..	..	48	155	..	..	..	..	..	..	..	..	553
S Herculis	..	..	..	..	..	..	3	..	110	17	9	188	..	8	..	29	24	..	..	..	..	..	..	..	33	..	..	..	..	..	..	..	..	2	423
T Herculis	19	..	..	..	..	..	92	..	129	26	6	..	12	7	..	..	..	62	..	..	..	84	..	..	43	..	..	..	..	..	..	..	..	..	480
R Aquilæ	..	..	..	..	..	..	1	..	141	..	5	200	..	..	..	..	..	..	31	1	..	22	..	..	48	139	..	..	..	..	..	1	..	..	589
R Cygni	..	..	..	..	13	..	105	..	108	50	4	..	..	2	..	..	34	22	..	1	..	71	..	..	38	144	..	..	..	107	28	..	..	..	727
χ Cygni	..	2	..	39	..	17	134	16	86	35	10	171	..	..	..	..	38	..	..	..	..	50	..	..	92	215	..	..	..	102	63	..	..	..	1,070
R Vulpeculæ	..	..	73	..	12	..	47	..	8	15	7	162	..	..	..	14	13	1	..	..	..	38	..	..	12	..	..	..	..	..	..	..	..	..	402
T Cephei	..	..	..	..	..	48	99	..	122	..	15	57	..	10	..	..	..	78	..	..	..	129	..	..	20	158	..	..	..	77	..	..	..	..	813
R Pegasi	..	..	..	11	..	..	6	..	68	31	6	128	2	..	..	..	21	15	33	1	31	6	..	..	22	..	..	..	..	..	..	..	..	..	381
R Cassiopeiæ	..	..	38	..	4	..	99	..	66	44	..	..	..	..	1	..	46	25	..	1	27	34	..	..	38	..	..	..	..	65	..	..	..	..	488
Totals	25	5	379	213	70	365	1813	21	2563	463	162	2505	59	138	3	127	363	584	189	24	213	1339	33	26	924	2291	20	121	20	638	257	25	213	26	16,217

In the general tables, pp. 15–352, are given the details of the individual observations; the form of these pages is similar to that of Volume XVIII., except that two columns have been omitted, which later experience has shown to be of little value, and in two other columns some curtailment of the details has been carried out.

Columns 1 and 2 explain themselves.

Column 3 gives information regarding the power used. Where an observer uses only one telescope its aperture will be found in Table A, and only the power is given. Mr. Brown, Professor Nijland, and Mr. Van der Bilt use two instruments, and the distinguishing letter T and t indicate the larger and smaller respectively. Mr. Butterworth occasionally used his $10\frac{1}{4}$-inch Reflector; such an observation is indicated by the letter M in the Remarks column.

Column 4 gives indication of the quality of the record, and is the only one of which the value is doubtful, but the Director has included it pending further experience.

Column 5 gives the abbreviated designation of the observer.

Column 6 gives the comparisons made. The Director is aware that in recent Harvard publications this information has been omitted, but is strongly of opinion that in all cases the stars used in the comparison (from which the magnitude in Column 7 is derived) should be recorded; without this, any alteration of the deduced magnitude, consequent on a revision of the magnitudes of the comparison stars, cannot be carried out.

The method of observation is chiefly fractional and dependent on the accepted magnitudes of the comparison stars. The comparison is expressed in Column 6 in tenths of a magnitude; thus in the first observation of R Andromedæ, 19−3, 22+1 means that the variable was $\frac{3}{10}$ths fainter than No. 19, and $\frac{1}{10}$th brighter than No. 22.

The comparison stars are identified by numbers or letters. In all cases *numbers* refer to Hagen's A.S.V.; small or Greek letters refer to the tables published in "Harvard Annals," Vol. XXXVII., Parts I. and II.; capital letters are explained in the heading to each star.

The magnitudes of the comparison stars are either those actually given in the above Harvard volumes or are deduced on the Harvard scale from the tables on pp. 198–200 of Vol. XXXVII., Part II.

To this there are four exceptions, viz., for W Andromedæ and X Aurigæ the magnitudes are taken from A.S.V., Series VI., Column H.P.; for V Boötis and S Ursæ Minoris from H.A., Vol. LVII., Part II., and from A.S.V., Series IV., Column H.P.

In the heading to each star are also given the designations in various systems; the six figures are those adopted by Harvard, the first four giving the R.A. in hours and minutes, and the remaining two the declination in degrees.

The number in brackets preceding the names is from

"Chandler's Catalogue," and that in brackets following the names is from a system of consecutive numeration recently revived by Professor A. A. Nijland, but originally suggested by Chambers and André.

Professor H. H. Turner, F.R.S., has again been kind enough to contribute an Introduction; those who read it will understand not only the interest he takes in this branch of astronomy, and the admirable work he has done in making use of old observations, but will also gather much encouragement to carry on the work and so provide material for future discussion, which at present can be obtained in no other way.

To Professor E. C. Pickering the Director and the section tender especial thanks for the determination and publication of so many sets of magnitudes for comparison stars, without which such work as ours would be much more difficult, and also for a most liberal supply of large scale photographs of many fields.

To Mr. A. N. Brown the Director is under a deep debt of gratitude; he has carefully revised and checked the whole of the MSS. of this volume; his help has greatly lightened the labour of producing it.

The cost of printing the Memoir is considerable; it has been met by a generous grant of £75 from the Government fund of the Royal Society, by contributions of £50 from Mr. A. N. Brown and the Director, one of £20 from Mr. C. F. Butterworth, and one of £40 from the B.A.A. The best thanks of the Association and the members of the Variable Star Section are tendered to the Royal Society and the above-named gentlemen.

The unfailing support of all the working members of the section has been a great encouragement to the Director in a somewhat arduous task; to acknowledge it adequately is not possible; their reward lies in the fascination of the work itself and in the knowledge that each succeeding volume gives additional value to those already published.

December, 1917.

INTRODUCTION.

By Professor H. H. Turner, F.R.S.

At first sight it might appear that the value of astronomical observations must have changed considerably in the last few centuries. When Tycho Brahe made his observations at Uraniborg, three centuries ago, kings and nobles paid him visits to marvel at his apparatus and to do honour to his skill: in these days an astronomer is seldom thus honoured. A century later we find from entries in Pound's account book that he occasionally received from Newton so much as fifty guineas for observations made for him; * and the value of the observations made by Flamsteed may be estimated from the serious quarrel which the right to dispose of them engendered between Flamsteed, who made them, and Newton and Halley, who wanted to use them. The present volume contains a large number of observations for which no charge is made, and which are freely issued for the use of anyone who cares to study them; and yet after all the value of observations has not really diminished in the interval of time since Tycho or Newton. There are still problems pressing for solution to which the present volume will be a valuable contribution; and were the observations ten times as numerous, not one of them would be superfluous. A market price may be real or fictitious. In the case of rare paintings by "old masters," or other unique objects of value, the fictitious market price depends essentially on the question whether more than one rich man may at a given moment wish to possess them. We may see some curious examples of fictitious market prices at the end of the war, when a great deal of the world's stock of money may have accumulated in the hands of neutral nations. But there is also a real market price, which is independent of these accidental circumstances, and from this truer point of view the value of the observations which follow is very high.

We may reckon roughly three epochs in the observation of variable stars; and a historical review is most easily begun with the last of them, fairly represented by the present volume. We have here *many observers* who have worked *steadily and persistently*, so that not only is the record nearly continuous, but it is made up of several independent threads, one of which checks another. Before that came the second epoch, represented in the opinion of the present writer chiefly by the Rousdon observations, which were *steady and persistent*, but made by *one observer* only. Few variable star observers have so continuous a record as Mr. Grover over so many years. One remarkable thing about him is that he seems to do without holidays, at any rate for more than a week or two at a time; and hence his observations do not show the gaps which interrupt some other valuable series. Before this was the first epoch, when the observations were made by *single observers* (that is

* See Rigaud's "Bradley," p. iii, footnote.

to say, there was no regular combination of workers), and were also *much broken up*. The amount of work done by such men as Pogson, Baxendell, and Knott, to mention English observers only, was quite admirable, but the publication of their observations, which is now nearly completed (thanks to the kind help of Mr. C. L. Brook and Miss Blagg), shows how broken are their series compared with that of Mr. Grover, for instance. Needless to say, these early observers have other special merits. Pogson, for instance, gave us for the first time a standard magnitude scale and method of record; the earlier variable star observers followed the notation of Sir William Herschel, which was needlessly cumbrous. Pogson would probably, moreover, have set an excellent example of continuity in record if he had not gone to India. His English observations show steady persistence, but the climate of India and other results of his change of life had a disastrous effect on his observations. There is one other series of observations by a single observer which is, we hope, soon to be published, and will probably be found to belong to the second category, namely, the observations of Dr. A. W. Roberts of Lovedale, South Africa. The Council of the Royal Astronomical Society is in correspondence with him on the subject, and a valuable outcome may be expected, but as yet the details of his long and devoted work are not to hand.

The observations of the Variable Star Section of the British Astronomical Association are not only valuable in themselves as a continuous and well-observed record of the stars selected, but should, it seems to me, give us material of great value in studying those made previously. How much of the variation of a variable star is real and due to the star itself, and how much is fictitious and due to the observer? That is a most important question, for the solution of which we have very little material. In discussing the Rousdon observations I made a comparison with those made at Harvard, and found that exceptional cases in the one series were seldom confirmed by the other. The actual figures will be found in the introduction to the Rousdon observations (Mem. R.A.S., Vol. LV., p. lx), and they are, of course, no more conclusive than the comparison of two sets of observations can be; but they suggest that a great many apparent irregularities may be due to the observer and not to the star itself. The present set of observations should throw much new light on this question. Here are available, not merely two sets, but a large number all concentrated on the same stars. They show undoubted deviations of a personal character: it remains only to classify these personal differences—these "personal equations"—to estimate their possible limits and perhaps their average value; so that, armed with this knowledge, we may be able to say how much of early observations may be fairly set down to personality. This study of personal equation is a necessary part of all visual observations, and since most photographs must be visually measured, it is possible that we may not altogether escape from personal equation even if photographs are substituted for eye-observations at the telescope. Indeed, we know already that measures of photo-

graphic spectra show curious personal equations which are not eliminated by reversing the spectrum end for end. To judge from the experience of measures of position, it may be many years before we realise to the full how one observer of a star's brightness may differ from another. In the case of measures of position it was at first assumed that the personal equation was constant, and that an observer could be ticketed with a fixed number, which rendered him practically equivalent to another observer. Procedure based on this belief was adopted and retained in practice for more than a century before it was realised that the personal equation might vary with the magnitude or brightness of the star. It is true that the "magnitude equation," as it is called, is not very serious for stars brighter than about the eighth magnitude; and during the century above-mentioned attention was chiefly confined to the brighter stars. Magnitude equation was discovered by Sir David Gill in discussing the places of sensibly fainter stars for his heliometer observations. Now there has been a similar transition from the use of bright to that of fainter stars in the case of variable star observations. We all know how, in the early years, attention was chiefly paid to the star at maximum, and how gradually attention has been extended to the minima, especially the faint minima; and there is no question now that the minima are just as important as the maxima. They are just as important for determining the form of the light curve, or for determining the period, the changes of period, or for any other problem in connection with variable stars that can be mentioned. It seems then quite probable that the personal equation for these fainter comparison stars may differ considerably from the equation for the brighter stars, and a long investigation may be necessary to settle this point. But further, there may be a complexity in measures of brightness which has not been (hitherto at any rate) recognised as affecting measures of position. It was shown in the case of T Cephei that the Rousdon observations differed from Harvard in one way where the star was on the rise and in another when it was on the fall, even though the brightness in the two cases might be the same. This is a very puzzling difference. If real, it must almost certainly be due to some difference in colour or spectrum of the star. As it stood when mentioned (Mem. R.A.S., Vol. LV., p. civ) it was only a single case. The wealth of material here provided should enable a search to be made for similar cases; and if others are established they would suggest that a careful watch be kept on the spectrum of a variable star throughout its period of variation. Indeed, this watch should be made in any event, and possibly at some future time the Variable Star Section may include among its activities frequent photographs of the spectra of variables at different times in their cycles.

Another suggestion occurs to me in connection with personal equation. (How easy it is to suggest work for others to do!) Could not a comparison of observers be made on artificial stars, just as artificial models have been devised for determining personal equation in measures of position? It would, indeed,

be a much easier matter to determine brightness-personal-equation and even colour-personal-equation than to determine position-personal-equation. A selected field of artificial "stars" of different brightnesses can quickly be made by boring small holes in a plate. The variable could be coloured according to fancy by bits of coloured glass, and made to vary in brightness by a photographic wedge. Two or three observers, who would arrange to meet together at convenient times, could quickly make a series of comparisons without suffering from the usual disability of cloudy weather. If it be asked how much information on this subject of personal equation is required, one may answer generally, just so much as will bring the results into good accordance. The great problem of the solar parallax may be considered for the present to be satisfactorily solved, because all the determinations are now in very good accordance. At some time in the future our methods of observation may improve so much in accuracy that this accordance will no longer satisfy us, and the problem may enter upon a new lease of life, but, for the moment, we may label it "solved"; and if the various observers who co-operate in the Variable Star Section can devise corrections which will bring all their observations into fair accord for any star at any time, we can also say that the problem of personality would be solved. On the other hand, until this accordance is reached further work may be profitably expended.

As above remarked, this information is chiefly wanted for the interpretation of the older results. From the copious results in this volume we can get very satisfactory light curves by simply trusting that the different peculiarities will balance one another, and drawing the curve through the middle of the dots. The diagrams which have already been published show clearly that a large measure of success has been attained in this way. But suppose now all the observations blotted out except those of one observer alone, even the most assiduous. How nearly would these same curves be reproduced? There will be quite considerable differences in places, which may be set down as due to the particular observer in question. If he alone had been observing, we should, however, have attributed them to the star, which would therefore have been judged to vary more irregularly than it should. And then it seems possible that we can use this information to guide us in discussing the earlier observations when a single observer is all we have. We might, of course, throw away the old observations and determine to start afresh with the modern ones, in which each phase in the light curve is watched by many observers; but the old ones are far too valuable for this course, seeing that they extend the period of observation to a length for which we should have to wait many years if we trusted to the new method alone. Moreover, imperfect as are these sporadic observations of scattered observers, they have at any rate clearly formulated several important problems, even if they have not solved them. My own attention has chiefly been concentrated on two of these problems: first, the variations in time of maximum (or other phase); and secondly, the characters of the light curves. It

is convenient to set the former problem first, because if the variation of the star is not absolutely regular, the form of its light curve may not be regular either. Whether there are any stars which repeat their maximum at precisely regular intervals is still somewhat doubtful. Certainly there are many of which it can be predicted that the intervals are not at all equal. Argelander had already noticed the inequalities, and suggested as an hypothesis that the maxima were subject to a periodic swing. He gave a uniform period for the star affected by the oscillation. Chandler adopted the same hypothesis and provided formulæ of the same type for a large number of variables. The formulæ were, of course, provisional, being derived from the study of a limited number of observations, and when more observations were added, the formulæ did not generally fit them. It was at first tolerably easy to modify the formulæ in order to secure a better fit. I paid some attention to these formulæ in considering the Rousdon observations, and was much impressed by their seeming reality, for two reasons. First, that just indicated, that if the formulæ were not quite correct, they could (in general) easily be corrected; and second, because there seemed to be a definite law connecting the constants of the formulæ together: that is to say, the extent of the oscillation and the time in which it was completed seemed possibly to depend upon the period of the star. Of these two reasons the first has since failed. Miss Blagg's careful work in revising the formulæ in connection with Baxendell's observations, successful though it was at first, has failed to satisfy the results of long series—where, for instance, the B.A.A. observations have been studied in connection with Baxendell's. Briefly, the case stands at present that *in no single instance* has one of Argelander's or Chandler's formulæ been confirmed where the whole cycle of the oscillation was available. In the case of S Herculis, Mr. Phillips ultimately found * a formula which would fit the observations, but it was much more complex than the simple suggestion of Chandler—unless it is perhaps simpler; for it seems possible that the much simpler hypothesis of *definite changes of period at certain epochs* is the real one to fit the facts, and in several other cases this *discontinuity hypothesis* seems to be the only one that will work satisfactorily. It amounts to this, that the star does vary with strict regularity for a definite term of years, and then something changes its period, when again it continues in the new cycle. There is nothing physically unreasonable in this. Even planetary revolution round the sun, which is one of our best approximations to strict uniformity of period, may be altered abruptly by something in the nature of an encounter. For the present, in discussing the observations of any particular star it seems best to retain both possibilities. The discussion of Baxendell's observations is now nearly completed, and in the latter part of it, Miss Blagg has both amended the formulæ to the best of her ability, and also considered what changes of period on the "discontinuity hypothesis" will satisfy the observations. In this work she has found the obser-

* "Mon. Not. R.A.S.," LXXV., p. 557.

vations of the B.A.A. Variable Star Section invaluable. They were at first not used in this discussion, not from any doubt as to their value, but because it was considered desirable to discuss separately the observations of each isolated observer, such as Baxendell, and to see what results they would give in themselves. It was at that time supposed that the individual series would all fit the sinecurve (when perhaps some specific alterations were made for personal equation), but that hope has gradually been abandoned in the light of further discussion. The necessity for finishing Baxendell's observations has, however, prevented Miss Blagg (or myself) spending on the B.A.A. observations the full attention they deserve. Moreover, we know that they have already attracted the attention of Mr. Phillips, who is discussing them in exactly the manner we should desire. As a result this question of the nature of the oscillation of maximum should certainly be advanced a definite stage, if not settled completely. At present the prospect seems to be in favour of the discontinuity hypothesis, that is to say, changes of period at definite epochs with regularity in between. If this is confirmed it should much simplify the discussion of the second problem, relating to the character of the light curve. It will clearly be necessary to treat each regular portion of the history by itself; but in this there is no difficulty, and it will be of the greatest interest to see whether the changes of period have an effect on the character of the curve. Quite possibly the shape of the curve may remain nearly the same, although the time scale is altered. The easiest mode of expressing the character of the curve is by means of a series of "harmonics," and the character is easily defined in terms of their coefficients and phases. When the character of a large number of curves has been thus obtained it is found that they fall into a regular series, the relations between the coefficients being gradually modified as we pass along the series, which includes our sun near one end. We thus seem to have open before us a method of classifying variable stars of long period which may lead to a physical explanation of the variation. Here again the valuable material in the present volume should be of the greatest help. [But see note at end of paper.]

Returning to the second reason, above stated, for regarding the formulæ of oscillating maxima as real (viz., the fact that the elements of oscillation seemed to be correlated with the period of the star), it now seems possible that this correlation is to be explained in a different way—as due to human rather than stellar causes. The paper * in which the correlation was worked out was written to serve a double purpose: firstly, to draw the attention of astronomers to the method of correlation as proposed by Professor Karl Pearson; and secondly, to give an example of the working of the method in the case of variable stars which seemed to lead to a suggestive result. In now modifying the interpretation of the result, it therefore seems only fair to say with clearness that no reflection is cast on the value of the method. Like all mathematical processes, it can only give us a mathematical result with correctness—it cannot

* "Mon. Not. R.A.S.," LXVIII., p. 544.

interpret the result, nor be responsible for interpretations put upon it. Some controversies about the method of correlation have arisen from confusing the purely mathematical apparatus with the interpretation put upon the result, which is unfortunate.

The human interpretation now offered was foreshadowed in § 33 (p. 558) of the original paper, a few words from which may be quoted :—

> . . . If P/A is constant we are confronted with the idea of a universal cycle controlling all these stars! The notion seems impossible, and yet there might be a simple explanation of it—the cause might be rooted in us, and not in the stars. . . . The period indicated is 360/·0264 days or 37·4 years.

Now thirty or forty years is comparable with the periods for which most of these stars have been under observation; and without going into details here, my present view is that, almost unconsciously, Chandler allowed this available period of observation to influence his results. The mechanical procedure of the method of correlation detected this influence; but at first I interpreted the detection wrongly.

Leaving this point now, with this brief indication of the present situation, let us turn to the very different question, how far are these visual observations likely to be displaced in the near future by photography, which is so rapidly invading all departments of astronomy? There is at present one peculiar difficulty in the way of photography: most of the variables are red, or reddish in colour, and it takes a long time to photograph them, or a large telescope, or both. I remember our photographing the region of S Cephei at Oxford, with exposure long enough to get the very faint comparison stars, so as to determine their places. There was not a trace of the variable itself on the plate, and we at first blamed our want of thought for selecting a time when it must have been near minimum; but on looking up the facts we found that it was actually close to maximum! Of course, S Cephei is very red in colour, and to photograph it with ordinary plates requires powerful apparatus and a longish exposure. But great improvements have been made recently in photography of red light, and more may follow. It would not be safe to assume that this difficulty will be permanent. At present it is sufficient (I think) to save for the visual observer this little oasis of real usefulness, and the Variable Star Section may rejoice in its occupation. There is no need to urge them "to make hay while the (distant) suns shine," for they are doing so with energy; of which we have sufficient evidence here in this goodly rick of their erection, well thatched, and guaranteed to provide much food for thought.

H. H. T.

UNIVERSITY OBSERVATORY, OXFORD,
1916 *October* 10.

[*P.S.*—Soon after this Introduction was written, the conclusion on p. 13 was essentially modified by the Presidential address, in which the Rev. T. E. R. Phillips divided the variables into *two* classes.]

(112) R ANDROMEDÆ. (V. 1.)

H.D. 001838.

NOTES.

As the magnitudes deduced from the photometric scale in Vol. XXXVII., Part II., Table XVIII. of the "Harvard Annals" do not in some cases suit the observations, the following Magnitudes were adopted.

No. in A.S.V.	Adopted Mag.	No. in A.S.V.	Adopted Mag.
25	10·00	28	11·04
37	11·73	40	12·00
54	13·50	55	13·70

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Jan. 10	8682	t.60	1	Bn.	19−3, 22+1	10·1	
,, 16	88	160	,,	Br.	=17	9·7	
,, 26	8698	T.70	,,	Bn.	19−3, 22+1	10·1	
,, 30	8702	T.50	,,	,,	25−1, 22+0·5	10·1	
Feb. 2	05	79	,,	Ma.	=28, =30	11·1	
,, 4	07	T.50	,,	Bn.	=24	10·3	
,, 21	24	160	,,	Br.	30−4, 37+2	11·5	
Mar. 6	37	,,	2	,,	37−3, 44+3	12·1	
,, 7	38	,,	1	,,	37−3, 44+3	12·1	
,, 13	8744	,,	,,	,,	40−1, 44+2	12·1	
May 29	8821	240	2	,,	<45	<12·0	Not seen.
June 13	36	,,	,,	,,	<45	<12·0	,, ,,
,, 19	42	T.120	1	Bn.	<36	<11·6	,, ,,
July 3	56	320	,,	Br.	a−3	14·2	Glimpsed.
,, 11	64	240	,,	,,	48−4, a+2	13·7	Twilight strong.
,, 13	66	132	3	F.G.B.	40−12	13·2	
,, 31	84	,,	2	,,	48−1, 53+3	13·5	
,, 31	84	160	1	Br.	44−3	12·7	
Aug. 2	86	183	,,	Ma.	40−3	12·3	
,, 6	90	66	,,	F.G.B.	=48, 53+4	13·4	
,, 8	92	160	,,	Br.	40−2, 44+2	12·2	
,, 10	8894	183	,,	Ma.	=40	12·0	
,, 20	8904	160	,,	Br.	=40	12·0	
,, 26	10	66	,,	F.G.B.	37−1, 40+3	11·8	
,, 31	15	160	,,	Br.	37−3, 40+1	12·0	
Sept. 3	18	132	,,	F.G.B.	=37	11·7	
,, 9	8924	66	,,	,,	28−3, 37+3	11·4	

(112) R ANDROMEDÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Sept. 12	8927	66	1	F.G.B.	=28	11·0	
,, 12	27	t.100	2	Bn.	30−2, 37+4	11·3	
,, 16	31	45	1	Br.	24−1, 28+4	10·5	
,, 20	35	66	,,	F.G.B.	15−1, 17+1	9·6	
,, 24	39	60	2	Bd.	=15	9·5	
,, 26	41	,,	1	,,	6−6, 15+2	9·3	
,, 27	42	45	,,	F.G.B.	7−3, 9+1·5	9·0	
,, 28	43	t.30	,,	Bn.	6−2, 9+3	8·9	
,, 29	44	,,	,,	,,	6−2, 9+3·5	8·8	
Oct. 2	47	30	,,	Bd.	5−2, 6+1	8·5	
,, 3	48	,,	,,	,,	5−2, 6+2	8·5	
,, 3	48	t.30	,,	Bn.	5−2, 6+1	8·5	
,, 4	49	30	,,	Bd.	=5	8·3	
,, 5	50	,,	,,	,,	4−4, 5+2	8·1	
,, 6	51	t.30	,,	Bn.	4−4, 5+1	8·2	
,, 7	52	30	,,	Bd.	4−2, 5+4	7·9	
,, 9	54	45	,,	Br.	3−8, 4−3, 5+4	7·9	
,, 10	55	,,	,,	F.G.B.	4−3, 5+3	8·0	
,, 11	56	30	2	Bd.	=3	6·9	
,, 20	65	45	1	F.G.B.	3−4, 4+4	7·3	
,, 21	66	30	,,	Bd.	=3	6·9	
,, 22	67	t.30	,,	Bn.	3−2, 2+1	7·2	
,, 25	70	30	,,	Bd.	=3	6·9	
,, 27	72	,,	2	,,	=3	6·9	
,, 28	73	45	1	F.G.B.	=3	6·9	
Nov. 1	77	,,	,,	,,	=3	6·9	
,, 1	77	30	,,	Bd.	=3	6·9	
,, 1	77	B.	,,	Bn.	c 4, =3	6·9	
,, 4	80	45	,,	Br.	3+1·5	6·8	
,, 7	83	,,	,,	F.G.B.	=3	6·9	
,, 7	83	B.	,,	Bn.	=3	6·9	
,, 11	87	t.30	,,	,,	−3, 2+3	7·0	
,, 11	87	45	,,	Br.	3+1	6·8	
,, 16	92	t.30	,,	Bn.	=3, 2+3	7·0	
,, 20	96	,,	,,	,,	3−1, 2+2	7·1	
,, 20	96	45	,,	Br.	=3	6·9	
,, 20	96	30	,,	Bd.	3−2, 4+6	7·1	
,, 22	8998	,,	,,	,,	3−4, 4+4	7·3	
,, 24	9000	,,	,,	,,	3−2, 4+6	7·1	
,, 28	04	,,	,,	,,	3−2, 4+6	7·1	
,, 29	05	45	,,	Br.	3−1	7·0	
Dec. 6	12	,,	,,	F.G.B.	=4	7·7	
,, 8	14	30	2	Bd.	3−6, 4+2	7·5	
,, 18	24	t.30	1	Bn.	4−2, 5+3·5	7·9	
,, 19	25	60	,,	Br.	3−4	7·3	
,, 24	30	45	,,	F.G.B.	4−3, 5+3	8·0	
,, 24	30	30	,,	Bd.	4−2, 5+4	7·9	
,, 24	30	t.30	,,	Bn.	=4	7·7	
,, 29	35	,,	,,	,,	4−4, 5+1	8·2	
,, 30	36	45	,,	Br.	3−8, 5+5	7·8	
,, 31	9037	30	,,	Bd.	4−4, 5+2	8·1	

(112) R ANDROMEDÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
Jan. 1	9038	t.30	1	Bn.	4−4·5, 5+1	8·2	
,, 7	44	45	,,	F.G.B.	=5	8·3	
,, 9	46	,,	,,	Br.	5+3, 7+5	8·1	
,, 14	51	t.30	,,	Bn.	4−5, 5+0·5	8·2	
,, 23	60	45	,,	Br.	7−2, 13+5	8·9	
,, 28	65	,,	,,	F.G.B.	7−4, 9+1	9·1	
,, 30	67	t.30	,,	Bn.	6−3·5, 9+2	9·0	
Feb. 2	70	45	,,	Br.	7−5, =9, 13+3	9·2	
,, 19	87	t.60	,,	Bn.	19−1, 22+2·5	9·9	
,, 22	90	T.50	,,	,,	17−1, 25+2	9·8	
,, 25	93	45	,,	Br.	13−2, 17+1	9·6	
,, 25	93	,,	2	F.G.B.	17−2, 21+2	9·9	
,, 26	94	T.95	,,	Bn.	19−1	9·9	
Mar. 1	9097	45	,,	F.G.B.	17−2, 21+2	9·9	
,, 4	9100	,,	1	Br.	17−1, 19+1	9·7	
May 24	81	198	3	F.G.B.	40−8	12·8	
,, 27	9184	,,	2	,,	44−2	12·6	
June 18	9206	240	1	Br.	<48	<13·4	Not seen.
July 10	28	198	3	F.G.B.	=48	13·4	
,, 21	39	,,	1	,,	*a*−1	14·0	
,, 21	39	240	,,	Br.	<*a*	<13·9	Not seen.
,, 31	49	T.120	,,	Bn.	<44	<12·4	,, ,,
Aug. 1	50	240	,,	Br.	<*a*	<13·9	Doubtfully seen.
,, 15	64	198	2	F.G.B.	=48	13·4	
,, 24	73	,,	1	,,	*a*−1	14·0	
Sept. 6	86	160	,,	Br.	<44	<12·4	Not seen.
,, 15	9295	198	,,	F.G.B.	48−3, 53+1·5	13·6	
,, 21	9301	160	,,	Br.	48−3, 49−3	13·6	
Oct. 1	11	T.120	,,	Bn.	40−7, 48+7	12·7	
,, 1	11	198	,,	F.G.B.	44−1	12·5	
,, 21	31	,,	,,	,,	=24	10·3	
,, 21	31	160	,,	Br.	28−1, 30+1	11·1	
,, 24	34	60	,,	Bd.	=22	10·2	
,, 25	35	,,	,,	,,	=25	10·0	
,, 26	36	45	,,	F.G.B.	19−2, 23+2	10·0	
,, 28	38	60	,,	Bd.	19−1, 25+1	9·9	
,, 30	40	,,	,,	Br.	19−6, 25+2	10·1	Doubtful.
,, 31	41	,,	2	Bd.	=19	9·8	
Nov. 1	42	45	1	F.G.B.	=17	9·7	
,, 12	53	,,	,,	,,	=13	9·4	
,, 20	61	60	2	Br.	5−2, 6+2	8·5	
Dec. 3	74	45	,,	,,	2−3, 3−7	7·6	
,, 4	75	,,	1	F.G.B.	4−4, 5+2	8·1	
,, 9	80	,,	,,	,,	4−3, 5+3	8·0	
,, 11	82	T.50	,,	Bn.	4−4, 5+2	8·1	
,, 11	9382	30	,,	Bd.	3−4·5, 5+9	7·4	

(112) R ANDROMEDÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
Dec. 12	9383	30	1	Bd.	3−3, 2+1	7·2	
„ 14	85	„	„	„	=2	7·4	
„ 15	86	„	„	„	2−2, 4+2	7·5	
„ 15	86	T.25	„	Bn.	4−3·5, 5+2	8·1	
„ 15	86	45	„	Br.	3−2	7·1	
„ 15	86	„	„	F.G.B.	4−1, 5+5	7·8	
„ 16	87	30	„	Bd.	=4	7·7	
„ 19	90	„	„	„	=4	7·7	
„ 22	93	„	„	„	2−3, 4+1	7·6	
„ 25	9396	45	2	F.G.B.	3−3, 2+1·5	7·2	Difficult owing to colour.
1912.							
Jan. 5	9407	„	1	Br.	=3	6·9	
„ 21	23	„	„	„	3−1	7·0	
„ 26	28	T.50	„	Bn.	4−1, 5+4·5	7·8	
Feb. 8	41	45	„	Br.	3−1	7·0	
„ 22	55	„	2	„	3−6, =4, 6+12	7·6	
Mar. 6	68	„	„	„	=5	8·3	
„ 19	81	„	1	„	=7	8·7	
„ 28	9490	„	2	„	7−2, 9+2	8·9	
July 15	9599	T.167	1	Bn.	<40	<12·0	Not seen.
Sept. 2	9648	240	„	Br.	a−2	14·1	R hazy looking.
„ 4	50	„	„	„	a−2	14·1	
„ 17	63	„	„	„	a−2	14·1	
„ 20	66	T.120	„	Bn.	<44	<12·4	Not seen.
Oct. 4	80	T.150	„	„	<40	<12·0	„ „
„ 4	80	90	„	Bh.	<42	<12·2	„ „
„ 7	83	„	2	„	<44	<12·4	
„ 10	86	240	1	Br.	a−1	14·0	
„ 17	9693	160	„	„	48−5, a+1	13·8	
„ 29	9705	„	„	„	44−5, 48+5	12·9	
Nov. 1	08	230	„	Th.	=40	12·0	
„ 2	09	90	„	Bh.	35−2, 40+2	11·8	
„ 11	18	„	„	„	30−2, 35+2	11·4	
„ 11	18	160	„	Br.	30−3, 37+3	11·4	
„ 17	24	230	„	Th.	=25	10·0	
„ 17	24	45	2	Bh.	22−1, =24, 26+1	10·3	
„ 19	26	90	1	„	13−5, 17−3, =19, 22+3, 24+5	9·9	
„ 26	33	45	„	„	13−1, =16, 17+1, =19	9·6	
„ 29	36	„	„	„	13−1, =14, =15, 17+1	9·6	
„ 29	36	300	„	Th.	17−0·5, =19, 25+3	9·7	
„ 30	37	„	2	„	=17, 19+1	9·7	
„ 30	37	45	1	Br.	13−2, 19+2	9·6	
Dec. 5	9742	„	2	Bh.	9−3, 13−1, 15+1, 16+3	9·4	

(112) R ANDROMEDÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Dec. 7	9744	..	1	Th.	15−1, 17+0·5	9·6	
„ 8	45	45	2	Bh.	9−2, =13, =15, 17+2	9·4	Redder than usual.
„ 8	45	230	1	Th.	13−2, 17+1	9·6	
„ 10	47	45	„	Bh.	10−1, 13+1, 11−1, 16+1	9·4	
„ 16	53	60	„	Th.	9−1, 13+3	9·2	
„ 16	53	45	„	Br.	7−2, 9+3	8·9	
„ 18	55	60	2	Th.	=7	8·7	Difficult. Red.
„ 19	56	45	„	Bh.	=12	9·3	
„ 23	60	„	„	„	5−5, =6, =7, 9+5	8·7	
„ 28	65	„	1	„	5+1, 6+5, 7+4	8·2	
„ 28	65	60	„	Th.	5−1, 6+3	8·4	
„ 28	65	45	„	Br.	5+1	8·2	
„ 30	67	t.30	„	Bn.	4−4·5, 5+1	8·2	
„ 31	68	F.	2	Th.	4−1·5, 5+4	7·9	
„ 31	68	45	„	Bh.	4−6, =5, 8+6	8·3	
1913.							
Jan. 2	70	„	„	„	4−6, =5, 8+6	8·3	Bright red.
„ 5	73	„	1	„	3−7, =4, 5+7	7·7	
„ 5	73	60	„	Th.	4−3, 5+3	8·0	
„ 5	73	t.30	„	Bn.	4−4, 5+1·5	8·1	
„ 9	77	45	„	Br.	=2, 3−5, 5+9	7·4	
„ 12	80	79	2	Ma.	3−2	7·1	Ruddy.
„ 12	80	45	1	Bh.	=3	6·9	Red.
„ 18	86	„	„	„	3−1	7·0	
„ 23	91	„	2	„	3−1	7·0	
„ 25	93	„	„	„	3−2, 4+5	7·2	Difficult to focus.
„ 25	93	62	1	Th.	=3	6·9	
„ 25	93	45	„	Br.	3+1	6·8	
„ 26	94	t.30	„	Bn.	3−2, 2+1	7·2	
„ 26	94	62	2	Th.	3−2	7·1	
„ 29	97	45	„	Bh.	3−2, 4+5	7·2	Difficult to focus.
„ 31	9799	„	1	„	=3	6·9	Sharp.
Feb. 3	9802	„	2	„	3+1	6·8	
„ 8	07	„	1	„	3+3	6·6	
„ 8	07	„	„	Br.	=3	6·9	
„ 8	07	50	„	Ma.	3+2	6·7	
„ 8	07	62	„	Th.	3−1	7·0	
„ 10	09	20	„	La.	c−4, 3+1	6·8	
„ 12	11	45	„	Bh.	3+1	6·8	
„ 15	14	20	„	La.	=3	6·9	
„ 16	15	„	„	„	c−4, 3+1	6·8	
„ 16	15	90	„	Bh.	3+1	6·8	
„ 20	19	45	„	Br.	3−1	7·0	
„ 22	21	„	2	Bh.	=3	6·9	
„ 22	21	37	1	Th.	3−1	7·0	
„ 23	22	20	2	La.	=3	6·9	Redder than 3.
„ 24	23	„	1	„	3−1, =4	7·4	
„ 25	24	90	„	Bh.	=3	6·9	
„ 25	9824	37	2	Th.	3−1, 4+6	7·1	

(112) R ANDROMEDÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Mar. 1	9828	20	1	La.	3−1, =4	7·4	
,, 2	29	,,	,,	,,	=3	6·9	Orange.
,, 2	29	45	2	Bh.	3−2	7·1	
,, 4	31	20	1	La.	3−2, =4	7·4	
,, 7	34	,,	,,	,,	2+2, 3−3, 4−2	7·4	
,, 7	34	45	,,	Br.	3−3	7·2	
,, 8	35	B.	2	Ma.	3−1	7·0	
,, 8	35	45	1	Bh.	3−2	7·1	
,, 11	38	37	3	Th.	4−2	7·9	
,, 11	38	20	1	La.	2+1, 3−2, =4	7·4	
,, 14	41	45	2	Bh.	=2, 3−4, 4+4	7·3	
,, 16	43	37	,,	Th.	4−2	7·9	Red.
,, 19	46	,,	3	,,	4−3, 8+9	8·0	
,, 25	52	60	1	Br.	5+1	8·2	
,, 25	52	45	2	Bh.	4−2, 5+2, 6+5	8·1	
,, 27	54	,,	,,	,,	3−10, 4−2, 5+2	8·0	
April 1	59	,,	1	,,	3−10, 4−1, 2−5	7·9	
,, 4	62	37	2	Th.	5+1·5	8·1	
,, 17	75	90	,,	Bh.	=6, =7	8·7	
,, 27	85	,,	,,	,,	=9, 10+3	9·1	
May 11	9899	,,	,,	,,	11−2, =15, 17+2	9·5	
,, 25	9913	45	1	,,	17−1, =19	9·8	
,, 27	15	160	,,	Br.	17−4, 24+2	10·1	
,, 31	19	90	2	Bh.	=17, =19	9·7	
June 4	23	150	,,	,,	17−2, 19−1, 24+4	9·9	M.
,, 9	28	40	,,	La.	17−6, 25+3	10·0	
,, 15	34	45	1	Bh.	=24	10·3	
,, 30	49	90	,,	,,	30−3, =35, 37+3	11·5	
July 8	57	,,	,,	,,	=35, 40+5	11·6	
,, 11	60	157	2	Th.	30−2, 35+2, 36+2	11·4	Difficult.
,, 13	62	T.150	1	Bn.	<37	<11·7	Not seen.
,, 19	68	150	,,	Bh.	36−2, 40+2, 45+2	11·8	
,, 26	75	,,	,,	,,	36−2·5, =40, 44+5	11·9	
,, 27	76	157	2	Th.	40+1	11·9	
,, 30	79	T.150	1	Bn.	40−1	12·1	
Aug. 2	82	160	,,	Br.	37−3, 44+3	12·1	
,, 4	84	150	,,	Bh.	40−2, 44+2	12·2	M.
,, 4	84	157	,,	Th.	=44	12·4	
,, 10	90	183	,,	Ma.	40−2	12·2	
,, 16	9996	90	,,	Bh.	=44, 46+1	12·5	
,, 25	0005	120	,,	Br.	44−5, 48+5	12·9	
,, 25	05	157	,,	Th.	48−3, 53+1	13·7	
Sept. 6	17	183	,,	Ma.	44−5	12·9	
,, 6	17	120	2	Ch.	=49	13·3	
,, 7	18	160	,,	Br.	44−7	13·1	About.
,, 7	18	157	1	Th.	a+1	13·8	
,, 8	19	183	,,	Ma.	44−5	12·9	
,, 9	20	150	2	Bh.	44−7	13·1	M.
,, 14	25	157	3	Th.	a+2	13·7	About.
,, 24	0035	210	1	,,	=a	13·9	

(112) R ANDROMEDÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Sept. 24	0035	240	2	Br.	$a+2$	13·7	Difficult.
„ 27	38	„	1	„	$a+2$	13·7	
Oct. 3	44	183	2	Ma.	<44	<12·4	Not seen.
„ 9	50	210	„	Th.	$a-2$	14·1	
„ 18	59	183	„	Ma.	<44	<12·4	
„ 23	64	240	1	Br.	$<a$	<13·9	Doubtfully seen.
„ 31	72	120	„	Bh.	<53	<13·8	M.
Nov. 1	73	240	„	Br.	$a+1$	13·8	
„ 5	77	210	„	Th.	$a-2$	14·1	
„ 8	80	120	„	Bh.	<48	<13·4	M.
„ 17	89	210	2	Th.	$a-1$	14·0	
„ 19	91	125	1	Ch.	$=a$	13·9	
„ 20	92	120	„	Br.	$=a$	13·9	About.
„ 21	93	157	„	Th.	$a-2$	14·1	
„ 22	94	120	„	Br.	$a-0·5$	14·0	
„ 24	0096	125	2	Ch.	$=a$	13·9	
„ 28	0100	T.150	1	Bn.	<48	<13·4	R glimpsed.
„ 29	01	125	„	Ch.	$=a$	13·9	About.
Dec. 1	03	150	„	Bh.	=48	13·4	M.
„ 4	06	„	„	„	40−5, 44−3	12·6	
„ 6	08	157	2	Th.	48−4	13·8	
„ 10	12	„	3	„	$a+4·5$	13·5	
„ 16	18	„	2	„	=47	12·6	
„ 16	18	160	1	Br.	44−5	12·9	About.
„ 16	18	150	„	Bh.	40−3, 41−1, =44	12·3	
„ 18	20	183	„	Ma.	40−4·5	12·5	
„ 18	20	T.150	„	Bn.	48−1	13·5	
„ 21	23	157	„	Th.	40−3, =44	12·3	
„ 23	25	120	„	„	40+1	11·9	
„ 23	25	150	„	Bh.	=40	12·0	
„ 24	26	160	„	Br.	37−2, 44+5	11·9	
„ 24	26	125	„	Ch.	36−2, 40+2	11·8	
„ 28	30	„	„	„	37−1, 35+1	11·7	
„ 28	30	145	„	Th.	=35	11·6	
„ 30	32	T.120	„	Bn.	=28, =30	11·1	
1914.							
Jan. 2	35	120	„	Br.	35−1, 37+1	11·7	
„ 4	37	60	„	Th.	=28, =30	11·1	
„ 5	38	„	„	„	24−3, 28+3	10·7	
„ 6	39	„	2	„	=25	10·0	
„ 6	39	90	1	Bh.	30−3, =35, 40+6	11·5	
„ 11	44	„	„	„	36+3	11·3	
„ 13	46	T.95	„	Bn.	24−6, 30+1	11·0	
„ 14	47	90	„	Bh.	17−1, 22−4, 25+2	10·1	
„ 18	51	„	„	„	=24	10·3	
„ 23	56	„	„	„	17−3, 19−2, 22+2, 24+3	10·0	
„ 23	56	145	„	Th.	17+0·5	9·6	
„ 23	56	79	2	Ma.	17+1	9·6	
„ 23	56	160	1	Br.	13−1, 19+3	9·5	
„ 26	0159	157	„	Th.	13+1, 17+2	9·4	

(112) R ANDROMEDÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Jan. 26	0159	45	1	Bh.	15−1, 17+1	9·6	
,, 26	59	T.50	,,	Bn.	13−1, =15	9·5	
,, 28	61	145	,,	Th.	17+2·5	9·4	
,, 30	63	45	2	Bh.	11−1, 15+1	9·4	
Feb. 1	65	145	1	Th.	7−2, 9+2	8·9	
,, 2	66	40	,,	Bc.	9−1, 13+1	9·3	
,, 2	66	45	,,	Bh.	6−4, 7−3, 11+3, 15+4	9·1	
,, 5	69	,,	,,	,,	=6, =7, 8+3	8·6	
,, 8	72	40	,,	Th.	6+2	8·5	
,, 10	74	,,	2	,,	=5	8·3	
,, 10	74	45	1	Bh.	3−9, 4−3, 5+3, 8+9	8·0	
,, 11	75	,,	,,	Br.	5+3, 6+6	8·0	
,, 15	79	50	,,	Ma.	3−7	7·6	
,, 15	79	45	2	Bh.	=4	7·7	
,, 15	79	T.25	1	Bn.	4−4, 5+1	8·2	
,, 16	80	40	,,	Th.	5+2·5	8·0	
,, 18	82	,,	,,	,,	4−2·5	8·0	
,, 21	85	,,	,,	Bc.	6−2, 9+4	8·8	
,, 21	85	45	,,	Bh.	2+1, 3−1	7·1	
,, 22	86	,,	,,	Br.	3−4	7·3	
,, 22	86	T.50	,,	Bn.	4−2, 5+2	8·0	
,, 26	90	45	,,	Bh.	2+3, 3+1	6·9	
,, 26	90	79	2	Ma.	3−6	7·5	
Mar. 7	0199	45	1	Bh.	3+1	6·8	
,, 10	0202	,,	,,	Br.	3+3	6·6	
,, 10	02	40	,,	Bc.	=2, 4+3	7·4	
,, 11	03	45	,,	Bh.	3+3	6·6	
,, 17	09	40	,,	Bc.	2−2, 4+1	7·6	
,, 18	10	90	,,	Bh.	3+3	6·6	
,, 21	13	45	,,	,,	3+2	6·7	
,, 21	13	T.50	,,	Bn.	=3	6·9	
,, 22	14	45	,,	Br.	=3	6·9	
,, 25	17	90	,,	Bh.	=3	6·9	
,, 29	21	45	,,	,,	2+1, 3−1	7·1	
April 3	26	,,	2	,,	2−3, 3−1	7·3	
,, 12	35	90	1	,,	3−2, 2+2	7·1	
,, 26	49	,,	,,	,,	=4	7·7	
,, 27	50	45	,,	,,	3−9, 4−1, 5+3	7·9	
May 2	55	90	,,	,,	4−3, 5+3, 8+9	8·0	
,, 18	71	,,	,,	,,	3−9, 4−3, 5+3, 8+9	8·0	
,, 25	78	45	2	,,	3−8, 5+3	7·9	
June 5	89	90	1	,,	3−11, 5+3	8·0	
,, 10	94	,,	,,	,,	=5, 8+5	8·3	
,, 13	97	45	,,	Br.	7−3	9·0	
,, 15	0299	,,	,,	Bh.	5−2, 7+2	8·5	
,, 22	0306	,,	2	,,	=9, 10+3	9·1	
,, 22	06	40	1	Th.	=7	8·7	
,, 24	08	T.50	,,	Bn.	=13, =15	9·5	
,, 27	11	45	,,	Br.	7−4, 13+3	9·1	
,, 30	0314	40	2	Th.	10+2	9·0	

(112) R ANDROMEDÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
July 3	0317	90	1	Bh.	=10	9·2	
„ 4	18	60	2	Th.	10−1	9·3	
„ 13	27	90	1	Bh.	15−2, =17, 19+1	9·7	
„ 19	33	„	„	„	17−1, 19+1	9·7	
„ 30	44	„	„	„	=25	10·0	
Aug. 2	47	160	„	Br.	25−2	10·2	
„ 4	49	60	2	Th.	17−3, 25+1	9·9	
„ 5	50	90	1	Bh.	25−6, 28−3, 30+6, 35+3	10·9	
„ 11	56	60	2	Th.	31+2	11·0	
„ 14	59	157	„	„	=30	11·2	
„ 21	66	„	1	„	37−1, 40+1	11·9	
„ 21	66	160	„	Br.	=37	11·7	
„ 23	68	90	„	Bh.	=35, =36	11·6	
„ 27	72	157	„	Th.	40−2	12·2	
Sept. 1	77	90	2	Bh.	36−2, 40+2	11·8	
„ 5	81	157	„	Th.	40−2	12·2	
„ 10	86	„	„	„	45−3	12·3	
„ 18	94	160	„	Br.	44−5	12·9	
„ 20	0396	90	1	Bh.	44−1	12·5	
„ 24	0400	157	2	Th.	=52	13·5	
„ 26	02	„	„	„	a+4·5	13·5	
„ 30	06	120	„	Br.	44−7	13·1	
Oct. 10	16	90	1	Bh.	44−4, =46	12·7	
„ 18	24	150	2	„	46−3	12·9	
„ 23	29	157	1	Th.	a−1	14·0	
„ 26	32	„	3	„	<40	<12·0	Not seen.
Nov. 3	40	150	1	Bh.	<46	<12·6	Glimpsed.
„ 7	44	„	2	„	48−5	13·9	M.
„ 10	47	120	„	Br.	<44	<12·4	Not seen.
„ 13	50	157	1	Th.	a−4	14·3	
„ 22	59	150	2	Bh.	48−5	13·9	M.
„ 23	60	220	„	Th.	a−3·5	14·3	Doubtfully glimpsed.
„ 27	64	120	1	Br.	..	<13·0	„ „
Dec. 7	74	220	2	Th.	a−3	14·2	
„ 13	80	120	1	Br.	<a	<13·9	Not seen.
„ 20	87	220	2	Th.	a−2	14·1	
„ 23	90	150	„	Bh.	48−10, 53−5	14·3	M.
„ 29	0496	220	3	Th.	a−1	14·0	

(782) R ARIETIS. (V. 1.)

H.D. 021024.

NOTES.

Star P = D.M. + 24° 325, 7·08 P.D.M.

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Jan. 8	8680	t.22	1	Ni.	4+1	8·6	
„ 10	82	t.30	„	Bn.	3−1, 4+3	8·4	
„ 15	87	t.22	„	Ni.	d−4, 3+1	8·2	Yellowish white.
„ 16	88	t.30	2	Bn.	2−12·5, 3+2	8·1	
„ 16	88	45	1	Br.	4+1	8·6	
„ 19	91	t.30	„	Bn.	2−12, 3+2·5	8·1	
„ 21	93	T.25	„	„	2−12·5, 3+2	8·1	
„ 25	97	t.30	„	„	2−12·5, 3+2	8·1	
„ 26	8698	„	„	„	2−12, 3+2·5	8·1	
„ 30	8702	„	„	„	2−11·5, 3+3	8·0	
„ 30	02	t.22	„	Ni.	d+2	7·6	Yellowish white.
Feb. 2	05	50	„	Ma.	4+6	8·1	
„ 2	05	T.25	„	Bn.	2−12, 3+2·5	8·1	
„ 3	06	t.30	„	„	2−12, 3+2·5	8·1	
„ 4	07	T.25	„	„	2−12·5, 3+2	8·1	
„ 8	11	„	„	„	2−12·5, 3+2	8·1	
„ 9	12	„	„	„	2−13, 3+1·5	8·2	
„ 9	12	t.22	„	Ni.	P−4, d+2·5	7·5	Yellow.
„ 11	14	T.25	„	Bn.	2−13·5, 3+1	8·2	
„ 12	15	45	„	Br.	3+2, 4+5	8·2	
„ 13	16	t.22	„	Ni.	=d	7·8	
„ 15	18	T.25	„	Bn.	3+1	8·2	
„ 21	24	45	„	Br.	P−9, 4+7	8·0	
„ 22	25	T.25	„	Bn.	2−13·5, 3+1	8·2	
„ 24	27	t.22	„	Ni.	d−2·5, 3+2·5	8·1	
Mar. 1	32	50	2	Ma.	4+2	8·5	
„ 1	32	45	1	Br.	4+3	8·4	
„ 3	34	t.22	„	Ni.	=3	8·3	Yellow.
„ 3	34	50	2	Ma.	=4	8·7	About.
„ 4	35	„	1	„	4+3·5	8·4	
„ 5	36	t.30	„	Bn.	3+1	8·2	
„ 8	39	45	„	Br.	4+1	8·6	
„ 13	44	t.22	„	Ni.	=4	8·7	
„ 15	46	45	„	Br.	=4	8·7	
„ 20	51	T.94	„	Ni.	4−5, 5+2	9·2	In t.22, 9·2.
„ 26	57	„	„	„	5−1, =7	9·6	
„ 31	8762	160	2	Br.	9−3, =10	10·3	
June 26	8849	T.94	1	Ni.	10−4, 14+4	10·7	
July 3	56	„	„	„	=10	10·3	
„ 11	64	160	„	Br.	9−8, 14+3	10·9	
„ 16	69	T.94	„	Ni.	7−3, 10+3·5	9·9	
„ 27	80	„	„	„	4−3, 5+3	9·1	In t.22, 9·1.
„ 31	8884	60	„	Br.	4−4, 5+2	9·2	

(782) R ARIETIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Aug. 2	8886	t.22	1	Ni.	4−4, 5+3	9·1	
„ 8	92	60	„	Br.	4−1	8·8	
„ 10	8894	t.22	„	Ni.	4−3, 5+3	9·1	
„ 20	8904	45	„	Br.	4−1, 5+6	8·8	
„ 29	13	t.22	„	Ni.	4−4, 5+2	9·2	
„ 30	14	t.75	„	Bn.	4−6, 5+1	9·3	
„ 31	15	45	„	Br.	4−4, 5+3	9·1	
Sept. 3	18	t.60	„	Bn.	6−0·5	9·7	
„ 12	27	„	„	„	=6, =7	9·6	
„ 17	32	45	„	Br.	=6, =7	9·6	
„ 20	35	T.94	„	Ni.	7+1	9·5	
„ 25	40	„	2	„	7−3, 10+3	9·9	
„ 28	43	t.100	1	Bn.	9−1, =10	10·2	
Oct. 2	47	T.94	„	Ni.	7−5, 10+1·5	10·1	
„ 9	54	80	„	Br.	14−2, 16+4	11·4	
„ 13	58	T.94	„	Ni.	14−3, 16+5	11·4	
„ 22	67	„	„	„	16−7, 20+7	12·6	
Nov. 2	78	T.150	„	Bn.	=20	13·3	
„ 4	80	160	„	Br.	=19	12·8	
„ 5	81	T.94	„	Ni.	=20	13·3	
„ 11	87	240	„	Br.	20−1, 28+3	13·3	
„ 16	92	T.167	„	Bn.	20−3, 26+1·5	13·6	
„ 19	95	T.94	2	Ni.	20−2, 28+2	13·4	Difficult.
„ 20	96	240	1	Br.	26+2, 28+2	13·5	
„ 20	96	T.167	„	Bn.	20−3, 26+1·5	13·6	
„ 21	8997	T.94	„	Ni.	20−2, 28+2	13·4	
„ 25	9001	„	„	„	20−2, 28+1	13·5	
„ 28	04	T.167	„	Bn.	20−3, 26+1·5	13·6	
„ 29	05	240	„	Br.	20−3, 28+1	13·5	
Dec. 4	10	T.94	2	Ni.	20−2, 28+2	13·4	
„ 13	19	„	„	„	=16	11·9	
„ 18	24	„	1	„	14−2·5, 16+5	11·4	
„ 18	24	T.95	„	Bn.	15−3, 16+3	11·6	
„ 19	25	240	„	Br.	14−5, =16, 18+5	11·8	
„ 22	28	T.95	„	Bn.	9−1, =10	10·2	
„ 24	30	t.85	„	„	9−1, =10	10·2	
„ 27	33	T.94	„	Ni.	7−4, 10+2·5	10·0	
„ 29	35	t.85	„	Bn.	9−1, 10+1	10·2	
1911.							
Jan. 1	38	„	„	„	7−3, 9+2	9·9	
„ 1	38	160	„	Br.	9−3, 14+7	10·4	
„ 9	46	45	„	„	=5, 6+3, 9+5	9·4	
„ 10	47	t.22	„	Ni.	4−4, 5+2	9·2	
„ 15	52	t.60	„	Bn.	5+2, 6+3·5	9·2	
„ 23	60	45	2	Br.	4−3, 5+3	9·1	
„ 29	66	t.22	1	Ni.	d−5, 4+4	8·3	
„ 30	67	t.30	„	Bn.	3−3, 4+1	8·6	
„ 30	9067	t.22	„	Ni.	3+1	8·2	Whitish yellow.

(782) R ARIETIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
Feb. 9	9077	t.22	1	Ni.	3+1·5	8·2	Yellowish white.
,, 11	79	45	,,	Br.	4+6	8·1	
,, 19	87	t.22	,,	Ni.	=3	8·3	
,, 19	87	t.30	,,	Bn.	3+2	8·1	
,, 20	88	,,	,,	,,	2−12, 3+2·5	8·1	
,, 22	90	T.25	,,	,,	3+2, 4+6	8·1	
,, 25	93	,,	,,	,,	3+2	8·1	
,, 25	93	45	,,	Br.	4+4	8·3	
,, 26	94	t.22	,,	Ni.	3−1, 4+2·5	8·4	Yellow.
Mar. 2	9098	T.25	,,	Bn.	3+1·5	8·2	
,, 4	9100	45	,,	Br.	4+4	8·3	
,, 5	01	t.22	,,	Ni.	3−2, 4+2	8·5	
,, 7	03	T.25	,,	Bn.	3−2, 4+1	8·6	
,, 9	05	,,	,,	,,	3−2, 4+2	8·5	
,, 19	15	T.94	,,	Ni.	4−1·5, 5+5	8·9	In t.22, 9·1.
,, 29	9125	,,	2	,,	=5	9·4	
June 17	9205	,,	,,	,,	14−6, 16+2	11·7	
July 2	20	,,	1	,,	=10	10·3	
,, 10	28	,,	,,	,,	7−4, 10+2·5	10·0	
,, 21	39	160	,,	Br.	7−1, 9+4	9·7	
,, 22	40	T.94	,,	Ni.	5−1, 7+1	9·5	In t.22, 9·5.
,, 31	49	t.30	,,	Bn.	4−3, 5+3	9·1	
Aug. 1	50	45	,,	Br.	4−1	8·8	
,, 3	52	T.94	,,	Ni.	=4	8·7	In t.22, 8·6.
,, 13	62	t.22	,,	,,	3+1·5	8·2	
,, 24	73	,,	,,	,,	3+1	8·2	
,, 24	73	45	,,	Br.	4+2	8·5	
,, 30	79	t.22	,,	Ni.	3+1	8·2	
Sept. 6	86	60	,,	Br.	3+1	8·2	
,, 17	9297	45	,,	,,	=4	8·7	
,, 21	9301	t.22	,,	Ni.	4−4, 5+3	9·1	
,, 26	06	,,	,,	,,	4−4, 5+3	9·1	
Oct. 1	11	T.50	,,	Bn.	5−1·5, 6+1	9·5	
,, 8	18	T.94	,,	Ni.	5−2, =7	9·6	
,, 16	26	,,	,,	,,	7−6, 10+0·5	10·2	
,, 18	28	T.95	2	Bn.	12+2	10·3	
,, 21	31	45	1	Br.	11−3, 14+1	11·1	
,, 26	36	T.94	,,	Ni.	14−2·5, 16+5	11·4	
,, 30	40	T.120	,,	Bn.	18+1	12·2	
,, 30	40	160	,,	Br.	14−6, 18+6	11·7	
Nov. 1	42	T.94	,,	Ni.	16−3, 20+10	12·2	
,, 12	53	,,	,,	,,	20−1, 28+2	13·4	
,, 20	61	160	,,	Br.	18−5, 20+4	12·8	
,, 21	62	T.167	,,	Bn.	20−3·5, 26+1	13·6	
,, 22	63	T.94	,,	Ni.	20−3, 28+0·5	13·6	
Dec. 8	79	,,	,,	,,	20−2, 28+1·5	13·5	
,, 9	80	240	,,	Br.	20−2, 28+2	13·4	
,, 9	9380	T.150	2	Bn.	20−4, 26+1	13·6	

(782) R ARIETIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
Dec. 11	9382	T.167	1	Bn.	20−3·5, 26+1	13·6	
,, 15	86	T.94	,,	Ni.	=20	13·3	
,, 17	88	160	,,	Br.	18−2, 19+2	12·6	
,, 23	94	T.94	,,	Ni.	14−6, 16+1·5	11·7	
,, 27	9398	,,	,,	,,	14−4, 16+4	11·5	
1912.							
Jan. 5	9407	160	,,	Br.	9−8, 14+4	10·8	
,, 7	09	T.94	,,	Ni.	7−5, 10+1·5	10·1	
,, 14	16	,,	,,	,,	=7	9·6	
,, 21	23	160	,,	Br.	9−2, =10	10·3	
,, 26	28	T.50	,,	Bn.	=6, =7	9·6	
,, 26	28	t.22	,,	Ni.	4−6, 5+1·5	9·3	
Feb. 2	35	,,	,,	,,	4−4, 5+4	9·1	
,, 4	37	T.25	,,	Bn.	4−4, 5+2	9·2	
,, 8	41	45	,,	Br.	4−3, 5+4	9·0	
,, 9	42	t.22	,,	Ni.	4−1, 5+6	8·8	Yellow.
,, 11	44	t.60	,,	Bn.	4−2, 5+5	8·9	
,, 22	55	45	,,	Br.	=4	8·7	
Mar. 3	65	t.22	,,	Ni.	3−2, 4+2	8·5	Yellow.
,, 6	68	45	,,	Br.	=4	8·7	
,, 7	69	T.25	,,	Bn.	3−2, 4+2	8·5	
,, 19	81	t.22	,,	Ni.	=4	8·7	
,, 19	81	45	,,	Br.	4−2, 5+5	8·9	
,, 28	90	,,	,,	,,	4−3, 5+4	9·0	
Apr. 3	9496	t.22	2	Ni.	4−4, 5+3	9·1	
June 7	9561	T.94	,,	,,	..	< 9·9	Not seen.
,, 18	72	,,	,,	,,	10−2	10·5	
July 9	93	,,	1	,,	7−1·5, 10+5	9·8	
,, 12	9596	,,	,,	,,	7−3, 10+3	9·9	
,, 23	9607	,,	2	,,	5+1·5	9·3	In t.22, 9·3.
,, 27	11	,,	,,	,,	4−5, 5+2	9·2	Uncertain.
Aug. 1	16	,,	1	,,	4−3, 5+4	9·0	
,, 6	21	t.22	,,	,,	3+0·5	8·3	
,, 16	31	,,	,,	,,	d−2, 3+2	8·1	
,, 27	42	,,	,,	,,	d−2, 3+2	8·1	
Sept. 2	48	45	,,	Br.	4+6	8·1	
,, 4	50	t.22	,,	Ni.	d−3·5, 3+2	8·1	
,, 12	58	,,	,,	,,	4−0·5, 5+6	8·8	
,, 15	61	,,	,,	,,	3−3, 4+1	8·6	
,, 17	63	45	2	Br.	4+2	8·5	
,, 20	66	T.50	1	Bn.	4−5, 5+2	9·2	
,, 20	66	41	2	Gd.	4+2	8·5	
,, 22	68	t.22	1	Ni.	4−2, 5+5	8·9	
Oct. 2	78	T.50	,,	Bn.	4−6·5, 6+3	9·3	
,, 3	79	t.22	,,	Ni.	4−4, 5+3	9·1	
,, 4	9680	T.50	,,	Bn.	5+1	9·3	

(782) R ARIETIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Oct. 9	9685	t.22	1	Ni.	5−0·5	9·5	
,, 10	86	45	,,	Br.	=6, 9+4	9·6	
,, 10	86	T.50	,,	Bn.	5+1	9·3	
,, 14	90	,,	,,	,,	=6	9·6	
,, 17	9693	t.22	,,	Ni.	5−2, 7+0·5	9·6	
,, 29	9705	160	,,	Br.	9−7, 14+4	10·8	
,, 31	07	T.94	,,	Ni.	10−4, 14+4	10·7	
Nov. 3	10	T.95	,,	Bn.	14−1	11·3	
,, 11	18	160	,,	Br.	14−6, 16+2	11·7	
,, 15	22	150	,,	Tn.	18−2, 19+2	12·6	
,, 18	25	,,	,,	,,	=20	13·3	
,, 18	25	T.94	2	Ni.	20+1	13·2	
,, 30	37	160	1	Br.	19−4, 24+2	13·2	
,, 30	37	150	,,	Tn.	20−2, 26+2	13·5	
Dec. 2	39	,,	2	,,	20−2, 26+2	13·5	
,, 2	39	T.94	1	Ni.	20−2, 28+1	13·5	
,, 12	49	,,	,,	,,	20+0·5, 28+3	13·3	
,, 12	49	T.167	,,	Bn.	20−2	13·5	
,, 16	53	T.94	,,	Ni.	=16, 20+2	12·5	
,, 16	53	160	,,	Br.	18−2, 19+2	12·6	
,, 26	63	150	,,	Tn.	=16	11·9	
,, 28	65	,,	,,	,,	11−9, 16+2	11·7	
,, 28	65	160	2	Br.	14−2	11·4	
,, 29	66	T.94	1	Ni.	14−2·5, 16+5	11·4	
,, 29	66	T.120	,,	Bn.	11−6, 14−2, 16+4	11·4	
,, 30	67	T.95	,,	,,	13−3, 15+1	11·1	
,, 30	67	79	,,	Ma.	14−1	11·3	
1913.							
Jan. 1	69	150	2	Tn.	11−8, 16+3	11·6	
,, 1	69	T.95	1	Bn.	13−2, 15+2	11·0	
,, 4	72	150	2	Tn.	11−3·5, 16+8	11·1	
,, 5	73	T.95	1	Bn.	=12, 13+1	10·6	
,, 6	74	45	,,	Br.	=14	11·2	
,, 8	76	T.94	,,	Ni.	7−3, 10+3	9·9	
,, 9	77	T.95	2	Bn.	9−1, 10+1	10·2	
,, 10	78	60	1	Tn.	11−3, 16+9	11·0	
,, 12	80	T.95	,,	Bn.	9−1, 10+1·5	10·1	
,, 12	80	79	,,	Ma.	9−4, 14+6	10·5	
,, 13	81	150	2	Tn.	=11	10·8	
,, 15	83	T.94	,,	Ni.	7−3, 10+4	9·9	
,, 20	88	T.95	,,	Bn.	5−4, 7−1, 9+2	9·8	
,, 25	93	45	1	Br.	6−4, 9+1	10·0	
,, 25	93	30	,,	Tn.	=9	10·1	
,, 26	94	T.50	,,	Bn.	5−1, 6+0·5	9·5	
,, 27	95	T.94	,,	Ni.	=5, 7+1·5	9·4	In t.22, 9·6.
,, 31	9799	T.50	,,	Bn.	4−5, 5+2, 6+2·5	9·3	
Feb. 5	9804	60	,,	Tn.	=5	9·4	
,, 6	05	t.22	,,	Ni.	4−4, 5+3	9·1	
,, 8	07	79	,,	Ma.	7+5	9·1	
,, 8	07	T.50	,,	Bn.	4−4, 5+2	9·2	
,, 9	9808	30	,,	Tn.	4−2, 5+5	8·9	

(782) R ARIETIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Feb. 11	9810	79	1	Ma.	7+7	8·9	
,, 13	12	30	2	Tn.	P−13, 4+3	8·4	
,, 16	15	50	1	Ma.	7+9	8·7	
,, 16	15	T.50	,,	Bn.	3−3·5, 4+1	8·6	
,, 19	18	,,	,,	,,	4+1·5	8·6	
,, 19	18	t.22	,,	Ni.	3−2, 4+2	8·5	
,, 20	19	45	2	Br.	3+1, 4+4	8·3	
,, 21	20	T.25	1	Bn.	3−2, 4+1	8·6	
,, 22	21	30	,,	Tn.	2−9, 4+9	7·8	
Mar. 1	28	t.22	,,	Ni.	3+1	8·2	
,, 5	32	,,	,,	,,	3+1	8·2	
,, 7	34	45	,,	Br.	3−2, 4+1	8·6	
,, 8	35	T.25	,,	Bn.	3−3·5, 4+1	8·6	
,, 11	38	30	,,	Tn.	2−13, 4+5	8·2	
,, 15	42	t.22	,,	Ni.	3−2·5, 4+1	8·6	
,, 25	52	,,	2	,,	4−3, 5+4	9·0	
,, 25	52	60	1	Br.	4−2, 5+6	8·9	
,, 26	53	,,	2	Tn.	=4	8·7	
,, 30	57	,,	,,	,,	4−3, 9+10	9·0	
Apr. 1	9859	,,	,,	,,	4−3, 5+3	9·1	
July 10	9959	T.94	1	Ni.	7−4, 10+3	10·0	
,, 12	61	,,	2	,,	7−4, 10+3	10·0	
Aug. 2	82	45	1	Br.	4−2, 5+5	8·9	
,, 12	9992	t.22	,,	Ni.	d−4, 3+1	8·2	
,, 22	0002	,,	,,	,,	d−3, 3+3	8·1	
,, 24	04	,,	,,	,,	d−1·5, 3+3	8·0	
,, 25	05	45	,,	Br.	4+2	8·5	
Sept. 6	17	t.30	,,	Bn.	2−12·5, 3+2	8·1	
,, 6	17	t.22	,,	Ni.	=3	8·3	
,, 7	18	45	,,	Br.	4+2	8·5	
,, 12	23	t.22	,,	Ni.	3−1, 4+2·5	8·4	
,, 24	35	45	,,	Br.	=4	8·7	
,, 24	35	T.25	,,	Bn.	3+1	8·2	
,, 25	36	t.22	,,	Ni.	=4	8·7	
,, 27	38	50	,,	Ma.	7+4	9·2	
,, 28	39	30	,,	Tn.	=4	8·7	
Oct. 1	42	79	,,	Ma.	7+2, 9+3·5	9·6	
,, 3	44	,,	,,	,,	7+4·5, 9+9	9·2	
,, 3	44	T.50	,,	Bn.	4−5, 5+1·5	9·2	
,, 3	44	t.22	,,	Ni.	4−2, 5+5	8·9	
,, 6	47	30	,,	Tn.	4−3, 5+3	9·1	
,, 9	50	79	,,	Ma.	7+1	9·5	About.
,, 9	50	T.50	,,	Bn.	4−6, 5+1	9·3	
,, 11	52	79	2	Ma.	7+1·5	9·5	
,, 12	53	T.94	1	Ni.	4−4, 5+3	9·1	In t.22, 9·2.
,, 13	54	79	2	Ma.	7+2	9·4	
,, 19	60	45	1	Br.	5−1, 6+1	9·5	
,, 20	61	T.94	2	Ni.	5−1, 7+0·5	9·5	In t.22, 9·6.
,, 22	63	60	1	Tn.	9−1, 10+1	10·2	
,, 25	0066	79	,,	Ma.	7−3, 10+3	9·9	

(782) R ARIETIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Oct. 25	0066	60	1	Tn.	=10	10·3	
,, 28	69	T.94	,,	Ni.	7−2·5, 10+4	9·9	
,, 30	71	60	2	Tn.	=12	10·5	
,, 31	72	45	1	Br.	9−8, 14+3	10·9	
Nov. 3	75	160	,,	,,	14+3	10·9	
,, 3	75	T.94	,,	Ni.	7−4, 10+2·5	10·0	
,, 5	77	T.50	,,	Bn.	13−2, 14+2	11·0	
,, 5	77	79	,,	Ma.	12−2	10·7	
,, 5	77	60	2	Tn.	=13	10·8	
,, 6	78	,,	1	,,	=15	11·3	
,, 18	90	79	,,	Ma.	17+2	12·1	About.
,, 18	90	T.94	,,	Ni.	=16	11·9	
,, 22	94	160	,,	Br.	16−1, 18+3	12·0	
,, 24	96	60	,,	Tn.	=17	12·3	
,, 25	97	T.94	,,	Ni.	14−7, 16+1	11·8	
,, 26	0098	150	2	Tn.	18−2, 19+2	12·6	
,, 28	0100	T.150	1	Bn.	18−3, 19+1·5	12·6	
Dec. 4	06	160	,,	Br.	14−9, 18+3	12·0	
,, 4	06	150	,,	Tn.	18−3, 20+7	12·6	
,, 6	08	T.94	,,	Ni.	16−11, 20+3	13·0	
,, 16	18	150	,,	Tn.	18−2, 20+8	12·5	
,, 18	20	T.167	,,	Bn.	18+1	12·2	
,, 18	20	T.94	,,	Ni.	16—4, 20+10	12·3	
,, 19	21	79	,,	Ma.	18+1·5, 20+2	12·6	
,, 24	26	45	,,	Br.	=16, 18+5	11·9	
,, 24	26	T.94	,,	Ni.	14−4, 16+4	11·5	
,, 24	26	60	,,	Tn.	15−5, 16+1	11·8	
,, 28	30	,,	,,	,,	15−5, 18+5	11·8	
,, 30	32	T.95	,,	Bn.	15−1, 16+4	11·4	
,, 31	33	T.94	,,	Ni.	10−6, 14+2	10·9	
,, 31	33	60	,,	Tn.	=15	11·3	
1914.							
Jan. 2	35	45	,,	Br.	=14	11·2	
,, 3	36	T.95	,,	Bn.	16−1	12·0	
,, 11	44	T.94	,,	Ni.	7+1	9·5	
,, 14	47	,,	,,	,,	=5, 7+2	9·4	In t.22, 9·4.
,, 14	47	60	,,	Tn.	7−5, 12+5	10·1	
,, 16	49	,,	,,	,,	=9	10·1	
,, 16	49	24	2	Bo.	9−2, 11+6	10·2	
,, 22	55	,,	,,	,,	=9	10·1	
,, 23	56	T.50	1	Bn.	=6, =7	9·6	
,, 23	56	45	,,	Br.	5−3, =6, 9+5	9·6	
,, 24	57	24	2	Bo.	8−1, 9+3	9·8	
,, 25	58	,,	,,	,,	5−1, 6+1	9·5	
,, 26	59	T.50	1	Bn.	=5	9·4	
,, 26	59	60	,,	Tn.	5−1·5, 6+1	9·5	
,, 27	60	t.22	,,	Ni.	4−6, 5+1	9·3	
,, 31	64	24	2	Bo.	=5	9·4	
Feb. 3	67	,,	1	,,	4−5, 5+1·5	9·2	
,, 4	68	t.22	,,	Ni.	4−1	8·8	
,, 6	0170	40	,,	Bc.	4−2, g+3	8·9	

(782) R ARIETIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914. Feb. 10	0174	24	2	Bo.	P−15, 4+1·5	8·6	
,, 11	75	45	1	Br.	4+1	8·6	
,, 15	79	50	,,	Ma.	=4	8·7	
,, 17	81	24	,,	Bo.	P−12, 4+4	8·3	
,, 18	82	T.50	,,	Bn.	3−2, 4+1	8·6	
,, 21	85	t.22	,,	Ni.	3+1, 4+2	8·4	
,, 22	86	T.25	,,	Bn.	3−2, 4+2	8·5	
,, 22	86	45	,,	Br.	3−1, 4+2	8·5	
,, 23	87	24	,,	Bo.	P−11, 4+5·5	8·2	
Mar. 1	93	t.22	,,	Ni.	3+0·5	8·3	
,, 7	0199	24	,,	Bo.	P−11, 4+5·5	8·2	
,, 10	0202	40	,,	Bc.	d−2, e+2	8·0	
,, 10	02	45	,,	Br.	3+1, 4+4	8·3	
,, 10	02	t.22	,,	Ni.	3+1	8·2	
,, 12	04	30	,,	Tn.	2−13, 4+5	8·2	
,, 14	06	t.22	,,	Ni.	3+1, 4+2	8·4	
,, 16	08	T.50	,,	Bn.	3+1	8·2	
,, 17	09	40	,,	Bc.	d−4, =e	8·2	
,, 21	13	T.50	,,	Bn.	=4	8·7	
,, 22	14	t.22	,,	Ni.	3−1, 4+2	8·5	
,, 22	14	45	,,	Br.	4+1	8·6	
,, 24	16	30	,,	Tn.	2−15, 4+3·5	8·3	
,, 31	0223	T.94	,,	Ni.	=4	8·7	
June 30	0314	,,	,,	,,	10−4, 14+4	10·7	
July 7	21	,,	,,	,,	=10	10·3	
,, 16	30	,,	,,	,,	7+1	9·5	
,, 27	41	t.22	,,	,,	4−6, 5+0·5	9·4	
Aug. 2	47	45	,,	Br.	4−3, 5+3	9·1	
,, 4	49	t.22	2	Ni.	4−3, 5+4	9·0	
,, 11	56	,,	1	,,	=4	8·7	
,, 19	64	,,	,,	,,	3+1	8·2	
,, 21	66	45	,,	Br.	4+4	8·3	
,, 26	71	30	,,	Tn.	P−11, 4+5	8·2	
,, 29	74	T.50	,,	Bn.	2−13, 3+1·5	8·2	
Sept. 1	77	t.22	,,	Ni.	3+2	8·1	
,, 9	85	,,	,,	,,	P−5, 3+7·5	7·6	
,, 15	91	T.50	,,	Bn.	2−13, 3+1	8·2	
,, 19	95	45	,,	Br.	4+4	8·3	
,, 20	0396	t.22	,,	Ni.	3+0·5	8·3	
,, 24	0400	T.25	,,	Bn.	2+13, 3+1	8·2	
,, 28	04	t.22	,,	Ni.	=3, 4+2	8·4	
,, 29	05	T.25	,,	Bn.	2−13, 3+1	8·2	
,, 29	05	30	,,	Tn.	2−13, 4+5	8·2	
,, 30	06	45	,,	Br.	4+5	8·2	
Oct. 4	10	40	2	Bc.	d−2, e+2	8·0	
,, 11	17	t.22	1	Ni.	4−3, 5+4	9·0	
,, 18	24	30	,,	Tn.	4−6, 6+3	9·3	
,, 20	26	40	,,	Bc.	=g, 5+2	9·2	
,, 24	0430	30	,,	Tn.	=9	10·1	

(782) R ARIETIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Nov. 5	0442	60	3	Tn.	=12	10·5	
,, 6	43	40	1	Bc.	9−4	10·5	
,, 7	44	T.94	,,	Ni.	=10	10·3	
,, 10	47	160	,,	Br.	14−3, 18+9	11·4	
,, 11	48	60	2	Tn.	=16	11·9	
,, 13	50	T.94	,,	Ni.	=16	11·9	
,, 16	53	,,	1	,,	16−3, 20+11	12·2	
,, 17	54	T.50	,,	Bn.	=6, =7	9·6	Probably erroneous. [C.L.B.]
,, 19	56	T.94	,,	Ni.	16−4, 20+10	12·3	
,, 23	60	160	,,	Tn.	18−2, 19+2	12·6	
,, 27	64	120	,,	Br.	18−2, 19+2	12·6	
Dec. 8	75	150	,,	Tn.	20−2, 26+2	13·5	
,, 13	80	T.94	2	Ni.	20−2	13·5	
,, 14	81	,,	1	,,	20−4, =28	13·6	
,, 14	81	160	,,	Br.	26+3, =28	13·5	
,, 15	82	60	,,	Tn.	=29	14·0	
,, 16	83	T.150	,,	Bn.	28+1	13·5	
,, 20	87	T.94	,,	Ni.	20−3·5, =2·8	13·6	
,, 23	90	150	2	Tn.	=26	13·7	
,, 24	0491	T.94	,,	Ni.	20−2, 28+2	13·4	

(787) W ANDROMEDÆ. (V. 6.)

H.D. 021143.

NOTES.

Star A = + 43° 459 B.D., est. 7·70.

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Dec. 19	9025	160	1	Br.	=5	9·4	
,, 30	36	,,	,,	,,	=5, =6	9·5	
1911.							
Jan. 1	38	T.94	,,	Ni.	6−2, 19+7	9·8	
,, 2	39	t.60	,,	Bn.	6−3, 11+1	9·8	
,, 7	44	66	2	F.G.B.	=19	10·5	
,, 9	46	160	1	Br.	=7	9·6	
,, 10	47	T.94	,,	Ni.	6−5, 19+5	10·0	
,, 23	60	160	,,	Br.	20−3, 27+1	10·8	
,, 29	66	T.94	,,	Ni.	19−4, 32+2	10·9	
,, 30	67	T.95	,,	Bn.	27−1, 37+4	11·0	
,, 30	9067	66	,,	F.G.B.	=32	11·1	

(787) W ANDROMEDÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
Feb. 8	9076	T.94	1	Ni.	32−2, 46+4·5	11·3	
„ 11	79	160	„	Br.	32−1, 37+3	11·2	
„ 19	87	T.94	„	Ni.	=46	11·8	
„ 25	93	160	„	Br.	37−2, 45+2	11·6	
„ 26	94	66	2	F.G.B.	37−1, 40+2	11·5	
„ 26	9094	T.94	1	Ni.	46−2, 54+3·5	12·0	
Mar. 4	9100	160	„	Br.	46−1, 49+1	11·9	
„ 5	01	T.94	„	Ni.	46−3, 54+3	12·1	
„ 19	15	„	„	„	=54	12·4	
April 3	30	„	„	„	54−3, 55+2	12·7	
„ 15	42	„	2	„	..	<12·8	Not seen.
May 4	61	„	1	„	..	<13·0	„ „
„ 26	9183	„	„	„	..	<12·8	„ „
June 17	9205	„	„	„	..	<13·5	„ „
July 2	20	„	„	„	54−4, 55+1·5	12·8	
„ 2	20	198	„	F.G.B.	50−5·5, 55+3	12·6	
„ 5	23	T.94	„	Ni.	54−3, 55+3	12·7	
„ 10	28	198	„	F.G.B.	=44	11·8	
„ 19	37	T.94	„	Ni.	46−3, 54+3	12·1	
„ 21	39	198	„	F.G.B.	=37	11·4	
„ 23	41	160	„	Br.	=37	11·4	
„ 27	45	T.94	„	Ni.	32−6, 46+1	11·7	
„ 28	46	200	„	Bi.	37−4, =46	11·8	
Aug. 3	52	160	„	Br.	27−3, 37+2	11·2	
„ 6	55	T.94	„	Ni.	32−4·5, 46+3	11·5	
„ 13	62	„	„	„	32−5, 46+2	11·6	
„ 14	63	198	„	F.G.B.	=46	11·8	
„ 17	66	200	„	Bi.	32−2, 37+1	11·3	
„ 22	71	„	„	„	=33	11·2	
„ 23	72	T.94	„	Ni.	32−4, 46+3	11·5	
„ 24	73	66	„	F.G.B.	32−2, 46+4·5	11·3	
„ 25	74	160	2	Br.	27−2, 37+2	11·2	
Sept. 10	90	66	1	F.G.B.	19−2, 27+2	10·7	
„ 17	9297	160	„	Br.	19−2, 33+5	10·7	
„ 21	9301	T.94	„	Ni.	6−3, 19+6·5	9·8	In t.22, 10·1.
„ 27	07	„	„	„	=3	9·1	In t.22, 9·5.
Oct. 1	11	45	„	F.G.B	=3	9·1	
„ 10	20	t.22	„	Ni.	A−2, d+4	7·9	Yellowish white.
„ 16	26	„	„	„	b−5, A+3	7·4	Yellow.
„ 21	31	45	„	Br.	2+5	7·2	
„ 26	36	„	2	F.G.B.	2+4	7·3	
„ 28	38	t.22	1	Ni.	b−2·5, A+5	7·2	Yellowish white.
„ 31	41	t.30	„	Bn.	2+3	7·4	
Nov. 1	42	45	2	F.G.B.	2+6	7·1	
„ 6	47	„	„	„	2+6	7·1	
„ 6	47	t.22	1	Ni.	a−6·5, b+3	6·6	
„ 18	9359	45	„	F.G.B.	2+2	7·5	

(787) W ANDROMEDÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
Nov. 21	9362	60	1	Br.	2+5	7·2	
„ 21	62	T.50	„	Bn.	2+4	7·3	
„ 21	62	t.22	„	Ni.	a−7·5, b+2	6·7	Yellow.
Dec. 4	75	45	„	Br.	2+7	7·0	
„ 4	75	„	„	F.G.B.	2+2	7·5	
„ 9	80	t.22	„	Ni.	b−2·5, A+5	7·2	
„ 11	82	45	„	F.G.B.	2+1	7·6	
„ 15	86	T.25	„	Bn.	2+2	7·5	
„ 17	88	60	„	Br.	2+2	7·5	
„ 17	88	t.22	„	Ni.	b−5, A+2·5	7·5	Yellow.
„ 20	91	45	„	F.G.B.	2−2	7·9	
„ 27	9398	t.22	„	Ni.	A−4, d+1·5	8·1	
1912.							
Jan. 5	9407	45	2	Br.	2−5	8·2	Uncertain.
„ 5	07	„	1	F.G.B.	2−7, 3+7	8·4	
„ 7	09	t.22	„	Ni.	A−5·5, d+1	8·2	
„ 14	16	„	„	„	d−6, 4+2·5	8·9	
„ 21	23	45	„	Br.	=4	9·2	
„ 26	28	t.22	„	Ni.	d−7·5, 4+1	9·1	Orange yellow.
„ 27	29	T.50	„	Bn.	3+2	8·9	
„ 27	29	45	„	F.G.B.	=3	9·1	
Feb. 4	37	T.94	„	Ni.	4+4	8·8	In t.22, 9·3.
„ 11	44	„	„	„	3−3, 6+1	9·4	
„ 11	44	45	„	F.G.B.	=5	9·4	
„ 16	49	160	2	Br.	=18, 19+1	10·4	
„ 29	62	45	1	F.G.B.	19−1, 27+3	10·6	
March 3	65	T.94	„	Ni.	6−9, 19+1·5	10·4	
„ 6	68	160	„	Br.	27−1, 32+1	11·0	
„ 7	69	132	„	F.G.B.	27−1, 32+1	11·0	
„ 17	79	T.94	„	Ni.	=32	11·1	
„ 19	81	„	„	„	=32	11·1	
„ 19	81	160	„	Br.	31−2, 37+1	11·3	
„ 28	90	„	„	„	37−1, 40+2	11·5	
April 1	9494	T.94	„	Ni.	32−4·5, 46+2	11·6	
„ 10	9503	„	2	„	46−5·5, 54+1	12·3	
„ 24	17	„	„	„	54−1	12·5	About, glimpsed.
May 10	33	„	„	„	=55	12·9	Uncertain.
„ 25	48	„	„	„	<55	<12·9	Not seen.
June 5	59	„	1	„	<55	<12·9	„ „
„ 6	60	132	2	F.G.B.	46−3	12·1	Very doubtful. [C.L.B.]
„ 18	72	T.94	1	Ni.	..	<13·3	Not seen.
„ 20	74	132	2	F.G.B.	=55	12·9	
July 9	93	T.94	1	Ni.	..	<13·4	Not seen.
„ 12	9596	„	„	„	..	<13·3	„ „
„ 23	9607	„	„	„	..	<13·3	„ „

(787) W ANDROMEDÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Aug. 6	9621	T.94	1	Ni.	..	<12·8	Not seen.
,, 9	24	,,	,,	,,	..	<13·4	,, ,,
,, 13	28	,,	2	,,	55−3	13·2	Uncertain.
,, 14	29	,,	1	,,	..	<13·5	Not seen.
,, 16	31	,,	,,	,,	55−4	13·3	
,, 18	33	,,	,,	,,	55−2	13·1	
,, 29	44	,,	,,	,,	54−3	12·7	
Sept. 2	48	240	,,	Br.	53−2, 55+4	12·5	
,, 4	50	T.94	,,	Ni.	54−3, 55+2	12·7	
,, 11	57	,,	,,	,,	54−3, 55+2	12·7	
,, 15	61	,,	,,	,,	54−3, 55+2	12·7	
,, 18	64	160	,,	Br.	54−2, 55+3	12·6	
,, 22	68	T.94	,,	Ni.	54−2, 55+2	12·7	
Oct. 3	79	,,	,,	,,	=54	12·4	
,, 4	80	T.150	,,	Bn.	37−10, 55+5	12·4	
,, 9	85	T.120	,,	,,	37−4	11·8	
,, 9	85	T.94	,,	Ni.	46−4, 54+2	12·2	
,, 10	86	160	,,	Br.	=45, =46	11·8	
,, 17	93	T.120	,,	Bn.	37−4, 55+11	11·8	
,, 17	9693	T.94	2	Ni.	46+1	11·7	
,, 29	9705	45	1	Br.	19−1, 24+1	10·6	
,, 31	07	T.94	,,	Ni.	6−7, 19+3	10·2	
Nov. 11	18	45	,,	Br.	4+3	8·9	
,, 21	28	t.22	,,	Ni.	d−7, 4+2	9·0	
,, 30	37	45	,,	Br.	2−7, 3+7	8·4	
Dec. 2	39	t.22	,,	Ni.	d−6, 4+3	8·9	
,, 12	49	,,	,,	,,	d−7, 4+2·5	9·0	
,, 17	54	T.50	,,	Bn.	2−10, 3+4	8·7	
,, 18	55	t.22	,,	Ni.	d−6, 4+3	8·9	Orange.
,, 23	60	45	,,	Br.	2−2	7·9	Dull orange.
,, 30	67	T.50	,,	Bn.	2−11, 3+3	8·8	Reddish orange.
1913.							
Jan. 2	70	45	,,	Br.	2−7, 3+7	8·4	
,, 3	71	t.22	,,	Ni.	d−7, 4+2	9·0	
,, 9	77	T.50	,,	Bn.	3+2	8·9	
,, 15	83	t.22	,,	Ni.	4+0·5	9·2	
,, 25	93	45	,,	Br.	3−2, 5+1	9·3	
,, 27	95	t.22	,,	Ni.	3+1, 4−2, 6+2·5	9·2	
,, 31	9799	T.50	,,	Bn.	6−1, 11+3	9·6	
Feb. 6	9805	T.94	,,	Ni.	6+2	9·3	In t.22, 10·0.
,, 19	18	,,	,,	,,	19−0·5	10·6	
,, 20	19	160	,,	Br.	19−2, 27+2	10·7	
,, 22	21	T.95	,,	Bn.	19−2	10·7	
Mar. 1	28	T.94	,,	Ni.	=32	11·1	
,, 7	34	160	,,	Br.	27−2, 37+3	11·1	
,, 15	42	T.94	,,	Ni.	32−2, 46+5	11·3	
,, 25	52	,,	,,	,,	32−4, 46+3	11·5	
,, 25	52	160	,,	Br.	37−1, 40+2	11·5	
,, 28	9855	T.120	,,	Bn.	37−1	11·5	

(787) W ANDROMEDÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913. Apr. 7	9865	T.94	1	Ni.	46−3, 54+2·5	12·1	
May 3	9891	,,	,,	,,	..	<12·3	Not seen.
,, 12	9900	,,	,,	,,	..	<12·1	,, ,,
,, 25	13	,,	,,	,,	..	<12·7	,, ,,
June 2	21	,,	,,	,,	=55	12·9	
,, 8	27	,,	,,	,,	54−3	12·7	Doubtfully visible.
,, 14	33	,,	,,	,,	=55	12·9	,, ,,
July 10	59	,,	,,	,,	..	<13·4	Not seen.
Aug. 2	82	160	,,	Br.	<52	<12·1	,, ,,
,, 12	9992	T.94	,,	Ni.	..	<13·7	,, ,,
,, 25	0005	,,	,,	,,	55−6	13·5	
,, 25	05	240	,,	Br.	55−6	13·5	Perhaps glimpsed.
,, 28	08	T.94	,,	Ni.	55−4	13·3	
Sept. 4	15	,,	,,	,,	55−3	13·2	
,, 6	17	183	,,	Ma.	55−1	13·0	
,, 7	18	T.200	,,	Bn.	<54	<12·4	Perhaps glimpsed.
,, 7	18	120	,,	Br.	55−5	13·4	
,, 11	22	T.94	2	Ni.	55−2	13·1	
,, 24	35	,,	1	,,	54−2, 55+2	12·7	
,, 24	35	160	,,	Br.	54−3, 55+2	12·7	
Oct. 3	44	183	2	Ma.	37−2	11·6	
,, 3	44	T.94	,,	Ni.	46−3, 54+3	12·1	
,, 13	54	,,	1	,,	32−3, 46+3	11·5	
,, 17	58	120	2	Br.	27−1	11·0	
,, 20	61	T.94	1	Ni.	19−4·5, 32+2	10·9	
,, 28	69	,,	,,	,,	19−2, 32+4	10·7	
,, 31	72	160	,,	Br.	20−3, 27+1	10·8	
Nov. 3	75	T.94	,,	Ni.	=19	10·5	
,, 18	90	,,	,,	,,	=6	9·5	
,, 22	94	160	,,	Br.	=6	9·5	
,, 25	0097	T.94	,,	Ni.	=6	9·5	In t.22, 9·5.
Dec. 6	0108	,,	,,	,,	4+2·5	9·0	In t.22, 9·2.
,, 14	16	T.50	,,	Bn.	2−2, 3+12	7·9	
,, 16	18	45	,,	Br.	2−4	8·1	
,, 18	20	t.22	,,	Ni.	A−1, d+4·5	7·8	
,, 24	26	45	,,	Br.	2+1	7·6	
,, 28	30	t.30	,,	Bn.	2+2	7·5	
,, 30	32	T.25	,,	,,	2+1·5	7·6	
,, 30	32	t.22	,,	Ni.	A+1·5	7·6	
1914. Jan. 2	35	45	,,	Br.	2+5	7·2	
,, 3	36	T.25	,,	Bn.	2+2	7·5	
,, 4	37	60	2	Th.	=2	7·7	
,, 5	38	62	1	,,	2+2	7·5	
,, 6	39	40	,,	,,	2+2·5	7·5	
,, 6	0139	T.25	,,	Bn.	2+1·5	7·6	

(787) W ANDROMEDÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Jan. 11	0144	t.22	1	Ni.	b−5, A+2·5	7·5	Yellowish white.
,, 15	48	,,	,,	,,	b−6, A+2	7·5	
,, 23	56	45	,,	Br.	2+1	7·6	
,, 23	56	60	,,	Th.	=2	7·7	
,, 24	57	T.25	,,	Bn.	2−1	7·8	
,, 26	59	60	2	Th.	2−2·5	8·0	
,, 27	60	t.22	,,	Ni.	A−3, d+2	8·1	
Feb. 1	65	60	,,	Th.	2−5	8·2	
,, 4	68	40	1	,,	2−3	8·0	
,, 5	69	t.22	,,	Ni.	A−5, d+1	8·2	
,, 8	72	40	2	Th.	2−3	8·0	
,, 10	74	,,	1	,,	2−2·5	8·0	
,, 15	79	T.25	,,	Bn.	2−11, 3+3	8·8	
,, 16	80	40	2	Th.	3+5	8·6	
,, 18	82	45	,,	Br.	2−9, 3+5	8·6	About.
,, 21	85	t.22	1	Ni.	d−7, 4+1·5	9·0	
,, 22	86	T.50	,,	Bn.	2−12, 3+2	8·9	
Mar. 1	93	45	,,	Br.	3+4, 4+4	8·8	
,, 1	0193	t.22	,,	Ni.	d−7, 4+1	9·1	
,, 10	0202	T.94	,,	,,	3+5	8·6	In t.22, 9·1.
,, 16	08	T.50	,,	Bn.	4−2, 6+1	9·4	
,, 19	11	T.94	,,	Ni.	3+1, =4	9·1	
,, 22	14	160	,,	Br.	=6	9·5	
,, 27	19	T.50	,,	Bn.	4−2, =6	9·5	
,, 31	23	T.94	,,	Ni.	6+0·5	9·5	
Apr. 14	37	,,	,,	,,	6−6, 19+4	10·1	
,, 22	45	,,	,,	,,	19−3, 32+3	10·8	
May 2	55	,,	2	,,	32−1	11·2	
,, 15	68	,,	1	,,	32−5, 46+2	11·6	
,, 30	0283	,,	,,	,,	=46	11·8	
June 21	0305	160	,,	Br.	<37	<11·4	Not seen.
,, 25	09	300	3	Th.	37−11	12·5	Rough observation.
,, 30	14	157	2	,,	55+1	12·8	
,, 30	14	T.94	1	Ni.	55+4·5	12·5	
July 16	30	,,	2	,,	=55	12·9	
,, 27	41	,,	1	,,	55−5	13·4	
Aug. 2	47	157	,,	Th.	55−4	13·3	
,, 11	56	,,	,,	,,	<55	<12·9	Not seen.
,, 14	59	T.94	,,	Ni.	55−5	13·4	Very uncertain.
,, 17	62	,,	,,	,,	55−8	13·7	
,, 21	66	120	,,	Br.	<55	<12·9	Not seen.
,, 25	70	157	3	Th.	55−5	13·4	Doubtfully glimpsed.
Sept. 15	91	T.94	1	Ni.	55−8	13·7	
,, 19	95	120	,,	Br.	<55	<12·9	Not seen.
,, 22	0398	T.94	,,	Ni.	55−6	13·5	
,, 24	0400	157	2	Th.	55−5	13·4	

(787) W ANDROMEDÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Sept. 26	0402	157	1	Th.	55−4	13·3	
„ 30	06	„	„	„	55−4	13·3	
Oct. 11	17	T.94	„	Ni.	=55	12·9	
„ 19	25	60	„	Ga.	<37	<11·4	Not seen.
„ 23	29	157	„	Th.	54−2, 55+2	12·7	
Nov. 2	39	T.94	„	Ni.	=46	11·8	
„ 10	47	160	„	Br.	=40	11·7	
„ 13	50	157	„	Th.	53+1	12·2	
„ 13	50	T.94	„	Ni.	32−6, 46+0·5	11·7	
„ 21	58	„	„	„	32−4, 46+2	11·6	
„ 27	64	160	„	Br.	37−2, 40+1	11·6	
Dec. 3	70	T.94	„	Ni.	32−2, 46+4	11·4	
„ 7	74	157	„	Th.	37+3	11·1	
„ 14	81	160	„	Br.	=33	11·2	
„ 16	83	T.94	„	Ni.	19−4, 32+2	10·9	
„ 19	86	157	2	Th.	19−4	10·9	
„ 20	87	60	„	Ga.	=18, =19, 21+3	10·4	
„ 21	88	T.94	1	Ni.	6−8, 19+1·5	10·3	
„ 23	90	60	„	Ga.	=19, =23	10·6	
„ 29	96	157	„	Th.	=5	9·4	
„ 31	0498	45	„	Br.	3+3	8·8	

(806) o (MIRA) CETI.

H.D. 0214*03*.

Star B = B.D. − 3° 362, 9·99 m.
„ D = B.D. − 3° 356, 9·39 m.
„ M = U.A. 244 Ceti, 6·92 m. R.H.P.
„ N = U.A. 224 „ 5·63 m. „
„ R = ξ Piscium, 4·78 m. „
„ S = π Ceti, 4·37 m. „
„ T = θ „ 3·83 m. H.P.
„ V = η „ 3·60 m. „

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Jan. 1	8673	B.	1	Gi.	α+1	7·2	
„ 3	75	40	„	Hw.	=α	7·3	
„ 5	77	B.	„	Gi.	=α	7·3	
„ 8	80	t.22	„	Ni.	α−5·5, β+2	7·8	Yellowish orange.
„ 10	82	„	„	„	α−6, β+1	7·9	
„ 10	8682	t.30	„	Bn.	α−6, β+2	7·9	

(806) o (MIRA) CETI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Jan. 12	8684	50	1	Ma.	α−2	7·5	Deep red.
,, 19	91	t.22	,,	Ni.	=β	8·0	Yellowish orange.
,, 20	92	45	,,	Br.	β−1	8·1	
,, 21	8693	t.22	,,	Ni.	=β	8·0	Yellowish orange.
,, 30	8702	,,	,,	,,	β−4, ε+7	8·5	
,, 30	02	t.30	,,	Bn.	β−1·5, γ+4	8·2	
,, 30	02	50	2	Ma.	β−4, ε+8	8·4	
Feb. 1	04	t.22	1	Ni.	β−3, ε+8	8·4	
,, 3	06	40	2	Hw.	β−5, δ+2	8·6	
,, 9	12	T.94	1	Ni.	β−4·5, ε+7	8·5	Orange. In t. 22, 8·6.
,, 11	14	40	,,	Hw.	β−5, δ+3	8·5	
,, 12	15	t.22	,,	Ni.	β−5·5, ε+6	8·6	
,, 18	21	45	,,	Br.	β−5, δ+3	8·5	
,, 24	27	T.94	,,	Ni.	β−5, ε+6·5	8·5	
Mar. 1	32	,,	,,	,,	β−9, ε+3	8·9	
,, 2	33	,,	,,	,,	β−8, ε+4	8·8	
,, 3	34	,,	,,	,,	β−8·5, ε+3	8·9	In t.22, 9·1.
,, 7	8738	45	,,	Br.	β−5, δ+2, ε+5	8·6	
June 12	8835	B.	,,	Gi.	=s, =t	5·5	
,, 17	40	N.E.	2	,,	n−2, o+1	4·4	
,, 23	46	,,	1	,,	k−1, l+2	3·6	
July 1	54	,,	2	,,	k+1	3·5	
,, 5	58	,,	1	,,	k+2	3·4	
,, 7	60	B.	3	Ni.	k−2	3·8	
,, 16	69	,,	2	,,	g−4, k+4	3·1	
,, 18	71	N.E.	1	Gi.	g−6, k+3	3·3	
,, 21	74	,,	,,	,,	k+2	3·4	
,, 27	80	B.	2	Ni.	g−7, k+2	3·4	
,, 29	82	,,	1	,,	g−5·5, k+3	3·2	
,, 29	82	N.E.	,,	Gi.	k+1	3·5	
Aug. 2	86	B.	,,	Ni.	g−6, k+2·5	3·3	
,, 9	93	,,	,,	,,	g−7, k+2	3·4	
,, 10	94	,,	,,	,,	g−7, k+2	3·4	
,, 10	94	,,	2	Br.	k−4, m+2	3·9	
,, 11	95	,,	1	Ni.	g−7, k+1·5	3·4	
,, 13	97	,,	,,	,,	g−7·5, k+1	3·4	
,, 14	98	,,	,,	,,	g−8, k+1	3·5	
,, 15	8899	50	2	Ma.	k−2	3·8	
,, 16	8900	B.	1	Ni.	k+0·5	3·5	
,, 19	03	,,	,,	,,	k−2, m+3·5	3·8	
,, 28	12	N.E.	2	Gi.	=l	3·8	
,, 29	13	B.	1	Ni.	k−4, m+2	3·9	
,, 31	15	,,	,,	Br.	m−3, R+3	4·5	
Sept. 1	16	,,	,,	Ni.	m−0·5	4·2	
,, 3	18	N.E.	,,	Gi.	=m	4·1	
,, 3	18	B.	,,	Br.	m−4, R+2	4·6	
,, 4	19	N.E.	,,	Gi.	=m	4·1	
,, 7	22	,,	2	,,	=o	4·4	
,, 9	24	,,	1	,,	=n	4·3	
,, 13	8928	,,	2	Hw.	p−2, r+2	4·9	

(806) *o* (MIRA) CETI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Sept. 15	8930	B.	2	Gi.	o−3, r+2	4·8	
„ 18	33	„	1	Ni.	=r	5·1	
„ 19	34	„	2	Br.	R−5	5·3	
„ 20	35	„	1	Ni.	=r	5·1	
„ 23	38	„	„	Gi.	=r	5·1	
„ 25	40	„	2	Ni.	r−2, t+2	5·3	
„ 26	41	„	„	„	r−3, t+1·5	5·4	
„ 26	41	„	1	Bd.	=s	5·4	
„ 27	42	„	„	Bn.	R−4, s+2	5·2	
„ 27	42	„	„	Gi.	r−2, s+1	5·3	
„ 27	42	N.E.	2	Hw.	=r	5·1	
„ 28	43	B.	1	Ni.	=t	5·5	
„ 29	44	„	„	Gi.	r−2, s+1	5·3	
„ 29	44	„	„	Bk.	=s	5·4	
„ 30	45	„	2	Ni.	r−3, t+1·5	5·4	
Oct. 1	46	„	1	Gi.	=s	5·4	
„ 2	47	„	„	Ni.	r−3·5, t+1	5·4	
„ 2	47	„	„	Bd.	s−3, y+6	5·7	
„ 3	48	„	„	Bn.	R−5, =s	5·3	
„ 4	49	„	„	Hw.	=s	5·4	
„ 4	49	„	„	Bd.	=w	5·8	
„ 6	51	„	„	Ni.	N−1·5, y+6	5·8	
„ 6	51	„	„	Bn.	=s	5·4	
„ 6	51	„	„	Gi.	=u	5·7	
„ 7	52	„	„	Ni.	N−2, y+5·5	5·8	
„ 7	52	„	„	Bd.	w−1·5, y+4	6·0	
„ 9	54	„	„	„	w−2, y+4	6·0	
„ 9	54	„	„	Br.	x−1, y+2	6·2	
„ 11	56	„	2	Bd.	w−3, y+3	6·1	
„ 12	57	„	„	Ni.	N−3, y+4·5	5·9	
„ 12	57	„	„	Gi.	w−2, x+1	6·0	
„ 13	58	t.22	1	Ni.	N+0·5	5·6	In B. 5·9.
„ 15	60	„	„	„	=N	5·6	
„ 20	65	„	„	„	N−1, y+6·5	5·7	
„ 20	65	B.	„	Bd.	y−2, z+1	6·6	
„ 22	67	„	„	„	y−2, z+1	6·6	
„ 22	67	t.22	„	Ni.	N−2·5, y+5	5·9	
„ 22	67	B.	„	Gi.	=y	6·4	
„ 23	68	t.22	„	Ni.	N−1·5, y+6	5·8	
„ 25	70	B.	„	Bd.	=z	6·7	
„ 25	70	„	2	Gi.	y−1, z+2	6·5	
„ 27	72	„	„	Bd.	=z	6·7	
„ 28	73	„	1	„	z−1, *a*+4	6·8	
„ 28	73	t.22	„	Ni.	N−3, y+4	5·9	
„ 30	75	B.	„	Bd.	z−1, *a*+4	6·8	
„ 31	76	„	2	Gi.	=z	6·7	
Nov. 1	77	„	1	Bd.	z−3, *a*+3	7·0	
„ 1	77	„	„	Bn.	=z	6·7	
„ 1	77	F.	„	Hw.	y−5, *a*+4	6·9	
„ 2	78	t.22	2	Ni.	y−1, z+2	6·5	
„ 2	78	B.	„	Gi.	z−2, *a*+4	6·9	
„ 4	80	„	1	Bd.	=*a*	7·3	
„ 4	80	„	„	Br.	y−5, *a*+3	6·9	
„ 4	8980	„	„	Gi.	z−1	6·8	

(806) *o* (MIRA) CETI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Nov. 5	8981	t.22	1	Ni.	z−1, α+5	6·8	Yellowish orange.
,, 6	82	B.	,,	Bd.	=α	7·3	
,, 7	83	F.	,,	Hw.	y−7, α+2	7·1	
,, 8	84	t.22	,,	Ni.	z−1, α+5	6·8	
,, 8	84	B.	,,	Br.	α+1	7·2	
,, 8	84	,,	,,	Gi.	z−2, α+4	6·9	
,, 9	85	t.22	,,	Ni.	z−1, α+5	6·8	
,, 11	87	,,	,,	,,	z−3, α+3	7·0	
,, 11	87	B.	,,	Gi.	z−4, α+2	7·1	
,, 14	90	t.22	,,	Ni.	z−4, α+2	7·1	Yellowish orange.
,, 16	92	B.	,,	Br.	=α	7·3	
,, 19	95	t.22	,,	Ni.	z−5, α+1	7·2	
,, 19	95	B.	2	Gi.	=α	7·3	
,, 20	96	,,	1	,,	=α	7·3	
,, 20	96	t.30	,,	Bn.	=α	7·3	
,, 21	97	t.22	,,	Ni.	z−4, α+1	7·1	
,, 23	99	,,	,,	,,	z−5, α+1	7·2	
,, 23	8999	B.	2	Gi.	=α	7·3	
,, 24	9000	,,	1	Bd.	=α	7·3	
,, 25	01	40	2	Hw.	α−2, β+5	7·5	
,, 27	03	B.	,,	Gi.	=α	7·3	
,, 28	04	30	1	Bd.	α−3, β+3	7·7	
,, 29	05	,,	,,	,,	=β	8·0	
Dec. 3	09	,,	,,	,,	=β	8·0	
,, 6	12	B.	2	Br.	β−1	8·1	
,, 6	12	40	1	Hw.	β−1, δ+6	8·2	
,, 7	13	t.22	,,	Ni.	α−6, β+1	7·9	
,, 8	14	30	2	Bd.	β−3, ε+9	8·3	
,, 18	24	t.22	1	Ni.	β−3, ε+8	8·4	Yellowish orange.
,, 19	25	60	,,	Br.	β−2, γ+3	8·3	
,, 19	25	40	,,	Hw.	β−3, δ+4·5	8·3	
,, 24	30	t.22	,,	Ni.	β−5, ε+7	8·5	
,, 24	30	30	,,	Bd.	β−6, ε+6	8·6	
,, 27	33	t.30	,,	Bn.	β−4, γ+1·5	8·4	
,, 27	33	t.22	,,	Ni.	β−5, ε+6	8·6	
,, 29	35	t.30	,,	Bn.	β−4·5, γ+1	8·5	
,, 30	36	t.22	,,	Ni.	β−5·5, ε+6	8·6	
,, 30	36	45	,,	Br.	γ−1, δ+2	8·7	
,, 31	37	30	,,	Bd.	β−8, ε+4	8·8	
1911.							
Jan. 6	43	40	,,	Hw.	δ+0·5, ε+4	8·8	
,, 6	43	t.30	,,	Bn.	β−5, γ+0·5	8·5	
,, 10	47	T.94	,,	Ni.	β−5, ε+7	8·5	In t.22, 8·7.
,, 13	50	,,	,,	,,	β−4, ε+8	8·4	Yellowish orange. In t.22, 9·0.
,, 16	53	60	,,	Bd.	=ε	9·2	
,, 16	53	160	,,	Br.	δ−2, ε+2	9·0	
,, 19	56	60	,,	Go.	δ−3, ε+1	9·1	
,, 23	60	,,	,,	Bd.	=ε	9·2	
,, 23	60	40	,,	Hw.	δ−3, ε+1	9·1	
,, 27	64	60	,,	Go.	δ−3, ε+1	9·1	
,, 28	65	160	,,	Br.	ε+1	9·1	
,, 28	65	60	,,	Bd.	ε−3, B+5	9·5	
,, 30	9067	40	,,	Hw.	δ−3, ε+1	9·1	

(806) *o* (MIRA) CETI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
Jan. 30	9067	t.60	1	Bn.	$=\varepsilon$	9·2	
,, 30	67	T.94	,,	Ni.	$\beta-9,\ \varepsilon+2$	9·0	Yellowish orange. In t.22, 9·1.
,, 31	68	,,	,,	,,	$\beta-9,\ \varepsilon+2·5$	8·9	In t.22, 9·3. Orange.
,, 31	68	T.50	,,	Bn.	$\varepsilon+2$	9·0	Red.
Feb. 9	77	T.94	,,	Ni.	$\beta-11,\ \varepsilon+1$	9·1	
,, 10	78	,,	,,	,,	$\varepsilon+0·5$	9·1	
,, 10	78	60	2	Bd.	$\varepsilon-4$, B+4	9·6	
,, 11	79	160	1	Br.	$=\varepsilon$	9·2	
,, 16	84	60	,,	Go.	$\delta-3,\ \varepsilon+1$	9·1	
,, 19	87	T.94	,,	Ni.	$\varepsilon+1·5$	9·0	Reddish orange. In t.22, 9·5.
,, 19	87	t.60	,,	Bn.	$\varepsilon-2$	9·4	
,, 20	88	T.94	,,	Ni.	$\varepsilon+0·5$	9·1	
,, 22	90	,,	,,	,,	$=\varepsilon$	9·2	
,, 26	94	,,	,,	,,	$\varepsilon+1·5$	9·0	In t.22, 9·4.
Mar. 1	97	,,	,,	,,	$\varepsilon-0·5$	9·2	
,, 2	9098	60	,,	Go.	$=\varepsilon$	9·2	
,, 4	9100	160	,,	Br.	$\varepsilon-2$	9·4	
,, 5	9101	T.94	,,	Ni.	$\varepsilon-0·5$	9·2	
June 20	9208	N.E.	2	Gi.	k+2	3·4	
,, 23	11	,,	,,	,,	g−5, k+3	3·2	
July 8	26	,,	,,	,,	k+2	3·4	
,, 11	29	B.	,,	Ni.	k+1·5	3·4	
,, 12	30	,,	,,	,,	k+0·5	3·5	
,, 13	31	,,	1	,,	k−0·5, m+5	3·6	
,, 19	37	,,	,,	Gi.	=k	3·6	
,, 21	39	,,	,,	Ni.	k−2, m+3·5	3·8	
,, 23	41	,,	,,	,,	k−2·5, m+3	3·8	
,, 24	42	N.E.	,,	Gi.	k−1, l+2	3·6	
,, 26	44	B.	,,	Ni.	k−3, m+2·5	3·9	
,, 28	46	N.E.	,,	Gi.	k−1, l+2	3·6	
,, 29	47	B.	,,	Ni.	k−3·5, m+2	3·9	
Aug. 3	52	,,	,,	,,	k−5, m+0·5	4·1	
,, 6	55	,,	,,	,,	k−5, m+0·5	4·1	
,, 6	55	N.E.	,,	Gi.	l−2, m+1	4·0	
,, 7	56	B.	,,	Ni.	=m	4·1	
,, 11	60	,,	2	,,	m−2	4·3	About.
,, 12	61	,,	1	,,	m−4, q+4	4·5	
,, 13	62	,,	,,	,,	m−6, q+3	4·7	
,, 13	62	,,	2	Go.	m−2, s+10·5	4·3	Very red.
,, 16	65	,,	1	,,	m−2·5, s+10	4·4	,, ,,
,, 17	66	,,	2	Ni.	q−1, r+0·5	5·0	
,, 17	66	,,	1	Gi.	m−2, =o	4·4	
,, 20	69	,,	,,	Ni.	r−1·5, t+3	5·2	
,, 25	74	,,	,,	,,	=r	5·1	
,, 25	74	,,	,,	Go.	m−8, s+4	5·0	Very red.
,, 27	76	,,	,,	Ni.	r−3, t+1·5	5·4	
,, 28	77	,,	,,	Gi.	q−2, r+1	5·1	
,, 29	78	,,	2	Go.	=t	5·5	Orange red.
,, 30	9279	,,	1	,,	=t, =N	5·6	,, ,,

(806) *o* (MIRA) CETI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
Sept. 1	9281	F.	1	Br.	t−6, y+3	6·1	
„ 3	83	B.	„	Gi.	t+1·5	5·4	
„ 5	85	„	„	„	=s	5·4	
„ 13	93	„	2	„	=w	5·8	
„ 17	97	„	1	Br.	=z	6·7	
„ 17	97	„	2	Go.	t−5, y+3	6·0	Orange red.
„ 18	98	„	1	„	y−1, z+2	6·5	„ „
„ 18	98	„	„	Gi.	x−2, y+1	6·3	
„ 18	98	„	2	Ni.	=z	6·7	
„ 19	9299	„	1	Go.	y−2, z+1	6·6	Orange red.
„ 22	9302	„	„	Ni.	y−2, z+0·5	6·6	
„ 23	03	„	„	Go.	y−2, z+1	6·6	Orange red.
„ 24	04	„	„	Gi.	=y	6·4	
„ 24	04	t.22	„	Ni.	N−5, y+2·5	6·1	In B. 6·8.
„ 26	06	„	„	„	N−6, y+1·5	6·2	Orange.
„ 28	08	„	„	„	N−6, =y	6·3	In B. 6·8.
„ 28	08	B.	„	Go.	=z	6·7	Orange red.
Oct. 1	11	t.22	„	Ni.	y−2, z+2	6·5	
„ 3	13	B.	„	Go.	z−1, α+5	6·8	
„ 8	18	t.22	„	Ni.	z−1, α+5	6·8	
„ 10	20	40	2	Hw.	y−5, α+5	6·8	
„ 11	21	B.	1	Go.	z−2, α+4	6·9	
„ 16	26	„	„	Bd.	=α	7·3	
„ 16	26	t.22	„	Ni.	z−2, α+3·5	6·9	
„ 18	28	„	„	„	z−3, α+2	7·0	
„ 18	28	B.	„	Bd.	=α	7·3	
„ 19	29	30	„	„	α−2, β+6	7·5	
„ 20	30	t.22	2	Ni.	α−3, β+5	7·6	
„ 21	31	B.	1	Br.	β−2	8·2	
„ 24	34	30	„	Bd.	α−2·5, β+5	7·5	
„ 24	34	t.22	„	Ni.	α−4·5, β+3	7·7	
„ 25	35	30	„	Go.	=α	7·3	
„ 25	35	„	„	Bd.	α−5, β+2·5	7·8	
„ 26	36	„	„	„	α−6, β+2	7·8	
„ 26	36	t.22	„	Ni.	α−5·5, β+2	7·8	
„ 28	38	30	„	Bd.	=β	8·0	
„ 28	38	B.	„	Br.	β−2, γ+3	8·3	
„ 28	38	t.30	„	Bn.	α−2, β+5·5	7·5	
„ 28	38	t.22	„	Ni.	α−3·5, β+4	7·6	
„ 31	41	30	„	Go.	α−4, γ+8	7·7	
„ 31	41	„	2	Bd.	β−1, γ+4	8·2	
„ 31	41	t.22	1	Ni.	=β	8·0	
Nov. 1	42	40	2	Gi.	α−2, β+3	7·6	
„ 1	42	t.22	1	Ni.	α−5·5, β+2	7·8	
„ 5	46	„	„	„	α−4, β+4	7·7	
„ 9	50	„	„	„	α−6, β+2	7·9	
„ 9	50	40	2	Gi.	α−3, β+1	7·8	
„ 10	51	30	1	Go.	=β	8·0	
„ 12	53	t.30	„	Bn.	α−6·5, β+1	7·9	
„ 14	55	t.22	2	Ni.	β−2·5, ε+9	8·3	
„ 14	55	40	1	Gi.	α−3, β+1·5	7·7	
„ 14	55	25	2	La.	β−2, δ+6	8·2	
„ 15	56	t.22	1	Ni.	β−3·5, ε+8	8·4	
„ 16	9357	40	„	Gi.	β+1	7·9	

(806) *o* (MIRA) CETI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
Nov. 20	9361	t.22	1	Ni.	$\beta-6$, $\varepsilon+6$	8·6	
,, 20	61	60	,,	Br.	$\beta-1$	8·1	
,, 20	61	30	,,	Go.	$\beta-4$, $\delta+4$	8·4	
,, 20	61	25	,,	La.	$\beta-3$, $\delta+5$	8·3	
,, 22	63	t.22	2	Ni.	$\beta-6$, $\varepsilon+6$	8·6	
,, 24	65	,,	1	,,	$\beta-8{\cdot}5$, $\varepsilon+3$	8·9	
,, 24	65	25	,,	La.	$\beta-4$, $\delta+4$	8·4	
,, 25	66	T.94	,,	Ni.	$\beta-3$, $\varepsilon+9$	8·3	In t.22, 8·8.
,, 25	66	40	2	Hw.	$\beta-4$, $\delta+4$	8·4	
,, 30	71	30	1	Go.	$\beta-6$, $\delta+1$	8·7	
,, 30	71	40	,,	Gi.	$\beta-2$, $\delta+4$	8·3	
Dec. 4	75	T.94	,,	Ni.	$\beta-4$, $\varepsilon+7{\cdot}5$	8·4	
,, 7	78	40	2	Hw.	$=\delta$	8·8	
,, 8	79	T.94	1	Ni.	$\beta-6$, $\varepsilon+6$	8·6	
,, 8	79	30	,,	Go.	$\beta-6$, $\delta+1$	8·7	
,, 9	80	T.94	,,	Ni.	$\beta-6$, $\varepsilon+6$	8·6	In t.22, 8·9.
,, 9	80	40	2	Gi.	$\beta-4$, $\delta+1{\cdot}5$	8·5	
,, 9	80	60	1	Br.	$\delta+2$, $\varepsilon+5$	8·7	
,, 10	81	25	2	La.	$=\gamma$	8·6	
,, 12	83	60	1	Bd.	$=\varepsilon$	9·2	
,, 14	85	,,	,,	,,	$\varepsilon-2$, B+6	9·4	
,, 14	85	T.94	,,	Ni.	$\beta-6$, $\varepsilon+6$	8·6	In t.22, 9·1.
,, 15	86	,,	,,	,,	$\beta-6$, $\varepsilon+6$	8·6	,, ,,
,, 15	86	40	2	Hw.	$\delta-1$, $\varepsilon+2{\cdot}5$	8·9	
,, 16	87	60	1	Bd.	$\varepsilon-2$, B+6	9·4	
,, 17	88	T.94	,,	Ni.	$\beta-8$, $\varepsilon+3$	8·9	
,, 17	88	40	,,	Gi.	$\delta+2$	8·6	
,, 17	88	160	,,	Br.	$\delta-1$, $\varepsilon+2$	9·0	
,, 19	90	60	,,	Bd.	$\varepsilon-2$, B+6	9·4	
,, 19	90	T.50	,,	Bn.	$=\varepsilon$	9·2	
,, 19	90	35	,,	La.	$\delta-2{\cdot}5$, $\varepsilon+1$	9·1	
,, 22	93	,,	,,	,,	$=\varepsilon$, D+2	9·2	
,, 22	93	60	,,	Bd.	$\varepsilon-3$, B+5	9·5	
,, 23	94	T.94	,,	Ni.	$\varepsilon+1$	9·1	
,, 23	94	40	2	Gi.	$=\varepsilon$	9·2	
,, 23	94	60	1	Go.	$\delta-3$, $\varepsilon+0{\cdot}5$	9·1	
,, 24	95	T.94	,,	Ni.	$\varepsilon-1$	9·3	
,, 25	96	40	2	Gi.	$\varepsilon+2$	9·0	
,, 26	97	,,	1	,,	$\varepsilon+2$	9·0	
,, 26	97	60	,,	Bd.	$\varepsilon-4$, B+4	9·6	
,, 28	9399	35	,,	La.	=D	9·4	
1912.							
Jan. 5	9407	160	,,	Br.	$\varepsilon-1$	9·3	
,, 6	08	60	,,	Bd.	$\varepsilon-4$, B+4	9·6	
,, 7	09	T.94	,,	Ni.	$\beta-10$, $\varepsilon+2$	9·0	In t.22, 9·3.
,, 7	09	40	,,	La.	$\varepsilon-2$, D+1	9·3	
,, 8	10	,,	,,	,,	$=\varepsilon$, D+2	9·2	
,, 8	10	,,	,,	Gi.	$\delta-4$, $\varepsilon+2$	9·1	
,, 9	11	60	,,	Bd.	$\varepsilon-4$, B+4	9·6	
,, 10	12	40	2	La.	$\varepsilon-1$, D+1·5	9·3	
,, 11	13	,,	1	,,	$\varepsilon-1$, D+1	9·3	
,, 12	14	,,	2	Gi.	$=\varepsilon$	9·2	
,, 14	9416	T.94	,,	Ni.	$\varepsilon-1$	9·3	

(806) *o* (MIRA) CETI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Jan. 17	9419	T.94	2	Ni.	$=\varepsilon$	9·2	In t.22, 9·4.
„ 17	19	60	1	Bd.	$\varepsilon-3$, B+5	9·5	
„ 18	20	„	„	„	$\varepsilon-4$, B+4	9·6	
„ 21	23	160	„	Br.	$\varepsilon-2$	9·4	
„ 22	24	60	2	Bd.	$\varepsilon-3$, B+5	9·5	
„ 22	24	75	„	Gi.	$\varepsilon-2$	9·4	6 inch at Catania.
„ 26	28	T.94	1	Ni.	$=\varepsilon$	9·2	In t.22, 9·4.
„ 27	29	„	„	„	$=\varepsilon$	9·2	In t.22, 9·2.
„ 27	29	40	2	Hw.	$=\varepsilon$	9·2	
„ 27	29	T.50	1	Bn.	$\delta-3$, $\varepsilon+1$	9·1	
„ 29	31	T.94	„	Ni.	$\varepsilon+1·5$	9·0	
„ 31	33	„	2	„	$\beta-10$, $\varepsilon+1·5$	9·0	
Feb. 1	34	50	1	Gi.	$\varepsilon-2·5$	9·4	
„ 2	35	T.94	„	Ni.	$\varepsilon+0·5$	9·1	
„ 4	37	„	„	„	$\varepsilon+1$	9·1	
„ 4	37	50	2	Gi.	$\varepsilon-2·5$	9·4	
„ 7	40	T.94	1	Ni.	$\beta-10$, $\varepsilon+1$	9·1	In t.22, 9·1.
„ 8	41	„	„	„	$\beta-11$, $\varepsilon+1$	9·1	„ „
„ 9	42	„	„	„	$\beta-10$, $\varepsilon+2$	9·0	„ „
„ 12	45	40	2	La.	$\delta-2$, $\varepsilon+1$	9·1	
„ 15	48	„	„	„	$=\varepsilon$	9·2	
„ 17	50	„	1	„	$=\varepsilon$	9·2	
„ 17	50	50	2	Gi.	$\varepsilon+2$	9·0	
„ 17	50	T.94	„	Ni.	$\varepsilon+1·5$	9·0	
„ 18	51	75	1	Gi.	$\varepsilon+2$	9·0	6 inch at Catania.
„ 21	54	T.94	„	Ni.	$\beta-9$, $\varepsilon+3$	8·9	In t.22, 9·1.
„ 21	54	40	„	La.	$=\varepsilon$	9·2	
„ 26	59	160	„	Br.	$\delta-2$, $\varepsilon+2$	9·0	
„ 29	62	40	„	La.	$\delta-2$, $\varepsilon+1$	9·1	
Mar. 3	65	T.94	2	Ni.	$\beta-6$, $\varepsilon+6$	8·6	
„ 4	66	40	„	La.	$\delta-2$, $\varepsilon+1$	9·1	
„ 6	68	160	„	Br.	$\varepsilon+2$	9·0	
„ 6	68	40	„	La.	$\delta-2$, $\varepsilon+1$	9·1	
„ 7	69	T.94	1	Ni.	$\beta-5$, $\varepsilon+7$	8·5	
„ 10	72	„	2	„	$\beta-6$, $\varepsilon+6$	8·6	
„ 11	73	40	„	La.	$\delta-2$, $\varepsilon+2$	9·0	
„ 11	73	„	„	Gi.	$\beta-4$, $\delta+2$	8·5	
„ 13	75	„	„	La.	$\delta-2$, $\varepsilon+2$	9·0	
„ 15	77	„	1	Gi.	$\beta-4$, $\delta+2$	8·5	
„ 19	9481	„	3	La.	$\varepsilon+4$	8·8	Glimpsed.
July 12	9596	20	1	„	t+4	5·1	
„ 16	9600	t.22	2	Ni.	=t	5·5	
„ 18	02	20	„	La.	t+3	5·2	Red.
„ 21	05	„	1	„	t−0·5, u+1	5·6	
„ 23	07	B.	„	Gi.	=w, x+3	5·8	
„ 23	07	t.22	2	Ni.	N−2·5	5·9	
„ 26	10	„	„	„	N−2, y+5·5	5·8	
„ 30	14	20	1	La.	t+3	5·2	
Aug. 1	16	„	„	„	=s	5·4	
„ 2	17	t.22	2	Ni.	N−2, y+6	5·8	
„ 3	18	B.	„	Gi.	w−1, x+2	5·9	
„ 6	9621	t.22	„	Ni.	N−2·5, y+5	5·9	

(806) *o* (MIRA) CETI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Aug. 8	9623	20	2	La.	=u	5·7	In B. 6·0.
,, 9	24	t.22	,,	Ni.	N−5·5, y+2	6·2	
,, 10	25	20	,,	La.	t−4, y+4	5·9	
,, 12	27	B.	,,	Gi.	=y	6·4	
,, 13	28	20	1	La.	=w	5·8	
,, 16	31	t.22	2	Ni.	N−4·5, y+3	6·1	
,, 17	32	40	1	Gi.	y−1, z+3	6·4	
,, 17	32	20	,,	La.	=y	6·4	
,, 18	33	t.22	2	Ni.	=y	6·4	
,, 19	34	,,	1	,,	N−5·5, y+2	6·2	
,, 23	38	20	,,	La.	y+1	6·3	In B. 6·7.
,, 27	42	t.22	2	Ni.	N−5, y+2·5	6·1	
,, 28	43	40	1	Gi.	y−1·5, α+6	6·6	
,, 30	45	20	,,	La.	y−3, α+6	6·7	
Sept. 5	51	t.22	2	Ni.	y−7, z−2, α+4	6·9	
,, 7	53	40	1	Gi.	z−2, α+2	7·0	
,, 7	53	20	,,	La.	=z	6·7	
,, 12	58	t.22	,,	Ni.	z−4, α+2	7·1	
,, 13	59	20	,,	La.	z−4·5, α+2	7·1	
,, 14	60	40	,,	Gi.	z−3, α+2	7·0	
,, 14	60	t.22	,,	Ni.	z−4, α+2	7·1	
,, 15	61	,,	,,	,,	z−4·5, α+2	7·1	
,, 17	63	45	2	Br.	=α	7·3	
,, 17	63	40	1	Gi.	z−4, α+1	7·1	
,, 18	64	20	,,	La.	=α	7·3	
,, 19	65	t.22	,,	Ni.	=α	7·3	
,, 20	66	,,	,,	,,	α−4, β+3	7·7	
,, 21	67	,,	,,	,,	α−5, β+2	7·8	
,, 22	68	,,	,,	,,	α−6, β+1·5	7·9	
,, 23	69	,,	,,	,,	α−5, β+2	7·8	
,, 23	69	20	,,	La.	α−2·5, β+5	7·5	
,, 24	70	t.22	,,	Ni.	α+1, β+4	7·4	
,, 25	71	,,	,,	,,	α+1	7·2	
,, 26	72	,,	2	,,	=α	7·3	
,, 27	73	,,	,,	,,	z−5, α+2, β+5	7·3	
Oct. 2	78	,,	1	,,	α−5·5, β+2	7·8	
,, 2	78	40	,,	Gi.	α−3, β+3	7·7	
,, 3	79	t.22	,,	Ni.	α−4, β+4	7·7	
,, 4	80	,,	,,	,,	α−6, β+1	7·9	
,, 4	80	t.30	,,	Bn.	α−6, β+1	7·9	
,, 5	81	t.22	,,	Ni.	α−6, β+1	7·9	
,, 7	83	,,	,,	,,	β+1	7·9	
,, 8	84	,,	,,	,,	=β	8·0	
,, 10	86	,,	2	,,	=β	8·0	
,, 10	86	40	,,	Gi.	α−3, β+2	7·7	
,, 10	86	t.30	,,	Bn.	β−1, γ+5	8·1	
,, 11	87	40	1	La.	β+1	7·9	
,, 12	88	t.22	,,	Ni.	β−1·5, ε+10	8·2	
,, 14	90	20	,,	La.	=β	8·0	
,, 14	90	40	2	Hw.	β−3, γ+3	8·3	
,, 15	91	20	1	La.	β−1, γ+4·5	8·1	
,, 15	91	t.22	,,	Ni.	β−2·5, ε+9	8·3	
,, 17	93	,,	,,	,,	β−4·5, ε+7	8·5	
,, 17	9693	45	,,	Br.	α−6, β+2	7·9	

(806) *o* (MIRA) CETI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Oct. 20	9696	40	1	Gi.	$=\beta, \gamma+2\cdot5$	8·2	
,, 27	9703	t.22	2	Ni.	$\beta-2\cdot5, \varepsilon+9$	8·3	
,, 29	05	45	1	Br.	$=\beta$	8·0	
,, 31	07	t.22	,,	Ni.	$\beta-5, \varepsilon+7$	8·5	
,, 31	07	20	2	La.	$\gamma-1, \delta+1$	8·7	
,, 31	07	40	,,	Hw.	$\beta-5, \delta+3$	8·5	
Nov. 1	08	,,	,,	Gi.	$\beta-3\cdot5, \gamma+2$	8·4	
,, 3	10	t.22	1	Ni.	$\beta-6, \varepsilon+6$	8·6	
,, 4	11	40	,,	La.	$\delta+2$	8·6	
,, 9	16	20	,,	,,	$=\delta$	8·8	
,, 11	18	45	,,	Br.	$\beta-2, \delta+6$	8·2	
,, 11	18	40	2	Hw.	$=\delta$	8·8	
,, 12	19	,,	,,	La.	$=\delta$	8·8	
,, 24	31	T.94	,,	Ni.	$\beta-6, \varepsilon+6$	8·6	
,, 28	35	,,	,,	,,	$\beta-8, \varepsilon+3\cdot5$	8·8	
Dec. 2	39	,,	1	,,	$\beta-5, \varepsilon+7$	8·5	In t.22, 9·0. Yellowish orange.
,, 3	40	,,	,,	,,	$\beta-6, \varepsilon+6$	8·6	In t.22, 9·1.
,, 3	40	40	,,	Gi.	$\gamma-2, \delta+1$	8·8	
,, 3	40	,,	,,	La.	$\varepsilon-1$	9·3	
,, 4	41	45	,,	Br.	$\delta+1$	8·7	
,, 5	42	T.94	,,	Ni.	$\beta-8, \varepsilon+3\cdot5$	8·8	
,, 7	44	40	,,	Gi.	$\gamma-3, \delta+2$	8·8	
,, 8	45	,,	,,	La.	$\delta-1, \varepsilon+2\cdot5$	8·9	
,, 9	46	,,	,,	,,	$\delta-2, \varepsilon+2$	9·0	
,, 12	49	T.94	,,	Ni.	$\beta-7, \varepsilon+4\cdot5$	8·7	In t.22, 9·1.
,, 12	49	t.30	,,	Bn.	$\delta-2\cdot5, \varepsilon+1$	9·1	
,, 15	52	40	,,	La.	$\delta-1, \varepsilon+2\cdot5$	8·9	
,, 16	53	T.94	2	Ni.	$\beta-8, \varepsilon+3$	8·9	
,, 21	58	,,	,,	,,	$\beta-7, \varepsilon+5$	8·7	
,, 23	60	45	1	Br.	$\beta-3, \delta+5$	8·3	
,, 29	66	50	,,	Ma.	$=\gamma$	8·6	
,, 29	66	T.94	,,	Ni.	$\beta-4, \varepsilon+7\cdot5$	8·4	In t.22, 9·0.
,, 29	66	t.30	,,	Bn.	$\gamma-1, \delta+2$	8·7	
,, 30	67	T.50	,,	,,	$\gamma-2, \delta+0\cdot5$	8·8	
,, 31	68	40	,,	Gi.	$=\gamma, \delta+3$	8·6	
1913.							
Jan. 1	69	T.50	,,	Bn.	$\gamma-2, \delta+0\cdot5$	8·8	
,, 2	70	45	,,	Br.	$\beta-4, \delta+4$	8·4	
,, 4	72	T.94	2	Ni.	$\beta-4, \varepsilon+7\cdot5$	8·4	In t.22, 8·9.
,, 5	73	50	,,	Th.	$\delta+3$	8·5	
,, 5	73	T.50	1	Bn.	$\gamma-1\cdot5, \delta+1$	8·7	
,, 6	74	40	2	Gi.	$\beta-3\cdot5, \gamma+1$	8·4	
,, 8	76	t.22	1	Ni.	$\beta-6, \varepsilon+6$	8·6	
,, 10	78	,,	,,	,,	$\beta-4\cdot5, \varepsilon+7$	8·5	
,, 12	80	T.50	,,	Bn.	$\gamma-1, \delta+1\cdot5$	8·7	
,, 12	80	,,	2	Ma.	$\delta+2\cdot5$	8·6	Deep red.
,, 18	86	t.22	,,	Ni.	$\beta-3\cdot5, \varepsilon+8$	8·4	
,, 25	93	,,	1	,,	$\beta-3\cdot5, \varepsilon+8$	8·4	
,, 25	93	45	,,	Br.	$\alpha-5, \beta+2\cdot5$	7·8	
,, 26	94	T.50	,,	Bn.	$\alpha-5\cdot5, \beta+2$	7·8	
,, 26	9794	t.22	,,	Ni.	$\beta-1, \varepsilon+11$	8·1	

(806) *o* (MIRA) CETI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Jan. 27	9795	t.22	1	Ni.	$=\beta$	8·0	
,, 31	99	,,	,,	,,	$=\beta$	8·0	
,, 31	9799	50	,,	Ma.	$\delta+5$	8·3	
Feb. 2	9801	T.50	,,	Bn.	$\alpha-2,\ \beta+5·5$	7·5	Red.
,, 3	02	40	,,	Gi.	$\alpha-2,\ \beta+3·5$	7·6	
,, 6	05	t.22	,,	Ni.	$\alpha-3,\ \beta+4$	7·6	
,, 8	07	,,	,,	,,	$\alpha-4,\ \beta+4$	7·7	
,, 8	07	45	2	Br.	$\alpha-3,\ \beta+5$	7·6	
,, 19	18	t.22	1	Ni.	y−2, z+1·5	6·5	
,, 20	19	,,	,,	,,	=y	6·4	
,, 21	20	,,	,,	,,	N−5·5, y+2	6·2	
,, 22	21	,,	,,	,,	N−3, y+3·5	6·0	In B. 6·7.
,, 23	22	,,	,,	,,	N−2, y+4·5	5·9	,, 6·6.
,, 24	23	,,	,,	,,	N−1·5, y+6	5·8	,, 6·5.
,, 24	23	45	2	Br.	y+4	6·0	
,, 25	24	B.	,,	Gi.	=y	6·4	
,, 25	24	t.22	,,	Ni.	=N	5·6	In B. 6·4
Mar. 1	28	,,	,,	,,	N+2	5·4	,, 5·9.
,, 3	30	B	1	Gi.	u−2, w+2	5·8	
,, 5	32	,,	2	Ni.	N+1·5	5·5	
,, 6	33	,,	1	Wd.	=r	5·1	
,, 7	34	,,	2	Br.	r−2, t+2	5·3	
,, 12	39	,,	1	Wd.	=r	5·1	
,, 17	44	,,	,,	,,	S−1	4·5	
,, 24	51	,,	,,	,,	k−0·5	3·6	
,, 28	55	,,	,,	,,	g−6, k+3	3·3	
,, 31	58	,,	,,	,,	g−4, k+4	3·1	
Apr. 1	59	,,	,,	,,	g−4, k+4	3·1	
,, 3	61	25	,,	,,	g−3, k+6	3·0	
,, 5	63	,,	,,	,,	g−3, k+6	3·0	
,, 9	67	,,	,,	,,	g−3, k+6	3·0	
,, 15	9873	,,	3	,,	g−3	3·0	
May 15	9903	,,	2	,,	V+2, T+4	3·4	
,, 29	17	,,	,,	,,	=V	3·6	
June 5	24	B	1	,,	k−3, m+3	3·8	
,, 10	29	,,	,,	,,	k−4, m+2	3·9	
,, 12	31	,,	,,	,,	k−4, m+2	3·9	
,, 25	44	,,	,,	,,	m−3, r+6	4·5	
July 1	50	,,	,,	,,	=q	4·9	
,, 5	54	25	,,	,,	=r	5·1	
,, 10	59	B	,,	,,	=r	5·1	
,, 23	72	t.22	2	Ni.	N−2·5, y+5	5·9	
Aug. 3	83	B	1	Wd.	=y	6·4	
,, 5	85	t.22	,,	Ni.	y+0·5	6·3	
,, 8	88	B	,,	Wd.	=y	6·4	
,, 14	9994	t.22	,,	Ni.	$z-2,\ \alpha+3$	6·9	
,, 22	0002	,,	,,	,,	$z-5,\ \alpha+1$	7·2	
,, 23	03	25	,,	Wd.	$z-3,\ \alpha+3$	7·0	Doubtful obs.
,, 24	0004	t.22	,,	Ni.	$=\alpha$	7·3	

(806) *o* (MIRA) CETI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Aug. 25	0005	t.22	1	Ni.	$\alpha-4$, $\beta+4$	7·7	
,, 26	06	,,	,,	,,	$\alpha-5$, $\beta+2$	7·8	
,, 28	08	,,	,,	,,	$\alpha-6$, $\beta+2$	7·9	
,, 30	10	,,	,,	,,	$=\beta$	8·0	
Sept. 2	13	25	,,	Wd.	$\alpha-4$, $\beta+4$	7·7	
,, 6	17	t.22	,,	Ni.	$=\beta$	8·0	
,, 7	18	t.30	,,	Bn.	$\alpha-5$, $\beta+2·5$	7·8	
,, 7	18	45	2	Br.	$\alpha-5$, $\beta+2·5$	7·8	
,, 8	19	40	,,	Hw.	$=\beta$	8·0	
,, 11	22	t.22	1	Ni.	$\beta-3$, $\varepsilon+9$	8·3	
,, 12	23	,,	,,	,,	$\beta-3$, $\varepsilon+9$	8·3	
,, 15	26	,,	,,	,,	$\beta-2$, $\varepsilon+9·5$	8·2	
,, 20	31	25	,,	Wd.	$\beta-3$, $\gamma+3$	8·3	
,, 24	35	79	2	Ma.	$=\delta$	8·8	
,, 24	35	t.22	1	Ni.	$\beta-5·5$, $\varepsilon+6$	8·6	
,, 24	35	20	,,	La.	$\beta-4$, $=\gamma$, $\delta+3$	8·5	
,, 25	36	T.94	,,	Ni.	$\beta-3·5$, $\varepsilon+8$	8·4	In t.22, 8·7.
,, 26	37	t.22	2	,,	$\beta-6$, $\varepsilon+6$	8·6	
,, 27	38	T.94	1	,,	$\beta-4·5$, $\varepsilon+7$	8·5	In t.22, 8·7.
,, 28	39	t.22	,,	,,	$\beta-7$, $\varepsilon+4·5$	8·7	
,, 29	40	T.94	2	,,	$\beta-5$, $\varepsilon+7$	8·5	In t.22, 8·7.
,, 30	41	25	1	Wd.	$\beta-4$, $\delta+4$	8·4	
,, 30	41	40	,,	Hw.	$\delta+3·5$, $\varepsilon+7$	8·5	
Oct. 3	44	T.94	2	Ni.	$\beta-5$, $\varepsilon+6·5$	8·5	In t.22, 8·9.
,, 9	50	,,	1	,,	$\beta-5$, $\varepsilon+6·5$	8·5	,, ,, 8·9.
,, 9	50	37	2	Th.	$\delta+2$	8·6	
,, 9	50	40	1	La.	$\gamma-1·5$, $\delta+1$	8·7	
,, 19	60	T.94	2	Ni.	$\beta-8$, $\varepsilon+4$	8·8	
,, 19	60	25	1	Wd.	$=\delta$	8·8	
,, 22	63	90	2	Hw.	$\delta-3$, $\varepsilon+0·5$	9·1	
,, 24	65	45	1	Br.	$=\delta$	8·8	
,, 24	65	25	,,	Wd.	$=\delta$	8·8	
,, 25	66	T.94	,,	Ni.	$\beta-9$, $\varepsilon+3$	8·9	In t.22, 9·1.
,, 25	66	40	2	La.	$\delta-1$, $\varepsilon+2·5$	8·9	
,, 28	69	T.94	1	Ni.	$\beta-9$, $\varepsilon+2·5$	8·9	In t.22, 9·1.
,, 30	71	40	,,	La.	$\delta-2$, $\varepsilon+1$	9·1	Orange.
Nov. 1	73	,,	2	Hw.	$\delta-3$, $\varepsilon+0·5$	9·1	
,, 3	75	T.94	1	Ni.	$\beta-10$, $\varepsilon+2$	9·0	In t.22, 9·2.
,, 3	75	79	,,	Ma.	$\varepsilon+1·5$	9·0	
,, 6	78	25	,,	Wd.	$\delta-2$, $\varepsilon+2$	9·0	
,, 6	78	T.94	2	Ni.	$\beta-10$, $\varepsilon+1$	9·1	
,, 11	83	,,	1	,,	$\beta-10$, $\varepsilon+2$	9·0	
,, 13	85	,,	,,	,,	$\beta-11$, $\varepsilon+1$	9·1	
,, 17	89	155	2	Th.	$\varepsilon+4$	8·8	
,, 18	90	T.94	1	Ni.	$\beta-9·5$, $\varepsilon+2$	9·0	
,, 18	90	79	,,	Ma.	$\varepsilon+2$	9·0	Reddish.
,, 18	90	40	,,	La.	$\delta-2$, $\varepsilon+2$	9·0	
,, 20	92	25	,,	Wd.	$\delta-2$, $\varepsilon+2$	9·0	
,, 22	94	45	,,	Br.	$=\delta$	8·8	
,, 22	94	T.94	,,	Ni.	$\beta-9·5$, $\varepsilon+2$	9·0	In t.22, 9·2.
,, 26	0098	40	,,	La.	$\delta-1$, $\varepsilon+2·5$	8·9	
,, 28	0100	T.50	,,	Bn.	$\gamma-2$, $\delta+0·5$	8·8	

(806) *o* (MIRA) CETI—*continued*.

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Nov. 29	0101	40	1	La.	$\delta-1, \epsilon+2{\cdot}5$	8·9	
„ 29	01	„	2	Hw.	$\delta-2, \epsilon+2$	9·0	
„ 30	02	25	1	Wd.	$=\delta$	8·8	
Dec. 1	03	80	„	Bk.	$\delta-1{\cdot}5, \epsilon+2$	9·0	
„ 1	03	T.94	„	Ni.	$\beta-9, \epsilon+2{\cdot}5$	8·9	In t.22, 9·1.
„ 4	06	45	„	Br.	$\beta-5, \delta+3$	8·5	
„ 6	08	T.94	2	Ni.	$\beta-4{\cdot}5, \epsilon+7$	8·5	In t.22, 9·0.
„ 11	13	40	„	La.	$\gamma-3, =\delta, \epsilon+5$	8·8	
„ 15	17	„	„	„	$\gamma-2, =\delta, \epsilon+4$	8·8	Orange.
„ 18	20	T.94	1	Ni.	$\beta-3, \epsilon+8$	8·4	In t.22, 9·0.
„ 18	20	79	„	Ma.	$\delta+5, \epsilon+8$	8·4	Reddish.
„ 18	20	40	2	Hw.	$\beta-7, \delta+1$	8·7	
„ 18	20	T.50	1	Bn.	$\gamma-1{\cdot}5, \delta+1$	8·7	
„ 19	21	t.22	„	Ni.	$\beta-6{\cdot}5, \epsilon+5$	8·7	
„ 19	21	25	„	Wd.	$=\gamma$	8·6	
„ 22	24	40	2	La.	$\gamma-1, \delta+1$	8·7	
„ 24	26	t.22	1	Ni.	$\beta-6, \epsilon+6$	8·6	
„ 24	26	45	„	Br.	$=\beta$	8·0	
„ 27	29	25	„	Wd.	$=\gamma$	8·6	
„ 27	29	40	„	La.	$\beta-4, \gamma+1, \delta+3$	8·5	
„ 28	30	t.22	„	Ni.	$\beta-4, \epsilon+8$	8·4	
„ 28	30	50	„	Ma.	$\delta+5$	8·3	
„ 30	32	T.50	„	Bn.	$\alpha-6, \beta+1{\cdot}5$	7·9	
1914.							
Jan. 2	35	45	„	Br.	$\alpha-5, \beta+2$	7·8	
„ 5	38	t.22	„	Ni.	$\alpha-5, \beta+2{\cdot}5$	7·8	
„ 11	44	„	„	„	z−4·5, $\alpha+2$	7·1	
„ 14	47	„	„	„	z−3	7·0	
„ 15	48	„	„	„	z−1·5, $\alpha+5$	6·8	
„ 15	48	20	2	La.	y−3, z−2	6·8	
„ 16	49	40	1	Bc.	z−3, $\alpha+3$	7·0	
„ 17	50	t.22	„	Ni.	z−1, $\alpha+5$	6·8	Orange. In B. 7·2.
„ 17	50	40	2	Hw.	y−5, $\alpha+5$	6·8	
„ 18	51	F.	1	Ma.	z−2·5, =M	6·9	
„ 20	53	B.	„	Ni.	z−2, $\alpha+4$	6·9	
„ 22	55	„	2	„	=z	6·7	
„ 22	55	F.	1	Ma.	y+1	6·3	
„ 23	56	B.	„	Bn.	w−4·5, y+1	6·3	
„ 23	56	„	„	Br.	y−3, $\alpha+6$	6·7	
„ 23	56	45	„	Bh.	s−2, x+4	5·6	
„ 23	56	t.22	„	Ni.	=N	5·6	Orange. In B. 6·3.
„ 25	58	20	„	La.	=t, y+10	5·4	
„ 26	59	„	„	„	s−2, r−4, t+2	5·5	Orange. In B. 5·7.
„ 26	59	B.	2	Bh.	q−2, s+2	5·2	
„ 29	62	20	1	La.	r−4, =s	5·4	In B. 5·4.
Feb. 1	65	B.	„	Ni.	t+1	5·4	
„ 2	66	„	„	„	t+2	5·3	
„ 2	0166	20	2	La.	m−7, r+3	4·8	Orange. In B. 4·9.

(806) *o* (MIRA) CETI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Feb. 2	0166	45	1	Bh.	=q, r+2	4·9	
„ 3	67	F.	„	Ma.	N+3	5·3	
„ 3	67	B.	„	Ni.	r−1	5·2	
„ 3	67	„	„	Wd.	=s	5·4	
„ 4	68	„	2	La.	p−2, q+1, r+4	4·8	
„ 4	68	„	1	Ni.	q−1, r+1	5·0	
„ 5	69	„	„	„	p−3, q+0·5	4·9	
„ 5	69	„	„	La.	p−1, q+2	4·7	
„ 5	69	„	„	Br.	R−1, r+2	4·9	
„ 5	69	„	2	Bh.	p−2, q+2	4·8	
„ 5	69	„	1	Ma.	N+4	5·2	
„ 6	70	„	„	Ni.	p−2, q+2	4·8	
„ 6	70	„	„	Bc.	m−3, =n	4·4	
„ 7	71	„	„	La.	=p, q+3, r+5	4·6	
„ 10	74	„	2	Br.	m−5	4·6	About.
„ 10	74	„	1	Ni.	m−3, p+1·5	4·5	
„ 10	74	„	2	Bh.	=p	4·6	
„ 10	74	„	3	Bo.	=m	4·1	
„ 11	75	„	1	Br.	m−1	4·2	
„ 12	76	„	„	Ni.	=m	4·1	
„ 13	77	„	„	Wd.	k−4, m+2	3·9	
„ 15	79	„	„	La.	h−7, k−1, l+2, m+4	3·7	
„ 15	79	„	„	Bk.	l−2, m−1	4·1	
„ 15	79	„	„	Wd.	k−2·5, m+4	3·8	
„ 15	79	„	2	Ma.	l−6, m−6	4·6	
„ 15	79	„	1	Bn.	m−3, R+3	4·5	
„ 15	79	„	„	Bh.	m−2, =n	4·3	
„ 16	80	„	„	„	l−1, m+1	4·0	
„ 17	81	„	„	La.	h−5, k+2, l+4, m+8	3·4	Orange.
„ 17	81	„	„	Wd.	k−2·5, m+4	3·8	
„ 18	82	N.E.	„	Ma.	l+2, m+3	3·7	
„ 18	82	B.	„	Wd.	=k	3·6	
„ 18	82	„	„	Bn.	m+2	3·9	
„ 18	82	„	„	Bh.	k−3, m+3	3·8	
„ 19	83	„	„	Wd.	=k	3·6	
„ 20	84	„	„	La.	h−5, k+2	3·4	
„ 21	85	„	„	Br.	k−3, m+3	3·8	
„ 21	85	„	„	Ni.	=k	3·6	
„ 21	85	„	„	Bh.	k−2·5, m+4	3·8	
„ 22	86	„	„	Bn.	k−4, m+1	4·0	
„ 22	86	„	„	Bh.	k−1·5, m+4	3·7	
„ 23	87	„	„	Ni.	k+1	3·5	
„ 23	87	„	„	Bh.	k−1, l+1	3·7	
„ 24	88	„	„	Wd.	g−4, k+4	3·1	
„ 24	88	„	„	Bn.	k−3·5, m+2	3·9	
„ 26	90	„	„	Ma.	k−3, m+3	3·8	
„ 26	90	„	„	Bn.	k−3·5, m+2	3·9	
„ 27	91	N.E.	2	Ga.	g−6, k+3	3·3	Yellowish.
„ 27	91	B.	„	Th.	m−2	4·3	
„ 28	92	„	1	Wd.	g−3, k+6	3·0	
„ 28	92	„	3	Bo.	g−7, k+2	3·4	
Mar. 1	93	„	1	Th.	k−1·5, m+4	3·7	
„ 1	0193	„	„	Bh.	=k, l+3, m+5	3·6	

(806) *o* (MIRA) CETI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Mar. 4	0196	B.	1	Bh.	k−1, l+1	3·7	
„ 4	96	„	„	Wd.	g−3, k+6	3·0	
„ 5	97	„	„	La.	=h, k+3	3·1	
„ 6	98	„	„	Bn.	k−2·5, m+3	3·8	
„ 6	98	N.E.	2	Ga.	=k	3·6	
„ 7	99	B.	1	Wd.	g−3, k+6	3·0	
„ 7	0199	„	„	Bh.	k−1, l+1·5	3·7	
„ 9	0201	„	2	La.	g−7, h−1, k+5	3·2	
„ 10	02	„	1	Br.	k−1, m+5	3·6	
„ 10	02	„	„	Bc.	=g	2·7	
„ 11	03	„	2	Bh.	k−1, l+1·5	3·7	
„ 11	03	„	1	Wd.	g−3, k+6	3·0	
„ 12	04	„	„	Bh.	k−1, l+1·5	3·7	
„ 13	05	„	„	La.	h−4, k+3	3·3	
„ 13	05	„	2	Ga.	=k, =l	3·7	Reddish.
„ 14	06	„	1	Wd.	g−3, k+6	3·0	
„ 14	06	„	2	Ni.	=k	3·6	
„ 16	08	„	„	Br.	k+3	3·3	Difficult.
„ 16	08	„	1	Bn.	k−4, m+1	4·0	
„ 16	08	„	„	La.	h−2, k+5	3·1	Orange red.
„ 17	09	„	„	Bc.	g−2	2·9	
„ 19	11	„	2	Ni.	k−1	3·7	
„ 21	13	„	1	Wd.	g−4, k+4	3·1	
„ 31	23	„	„	„	g−6, k+3	3·3	
Apr. 4	27	„	„	„	g−6, k+3	3·3	
„ 10	33	„	„	„	g−6, k+3	3·3	
May 24	0277	„	„	„	=s	5·4	
June 29	0313	25	„	„	=y	6·4	
July 6	20	45	„	Bh.	y−2	6·6	
„ 13	27	„	2	„	y−4, α+4	6·8	
„ 19	33	„	1	„	y−7, α+2	7·1	
„ 19	33	20	„	La.	α−5, β+2·5	7·8	
„ 21	35	t.22	2	Ni.	α−4, β+3	7·7	
„ 27	41	„	„	„	β−1	8·1	
„ 30	44	45	1	Bh.	β+3	7·7	
„ 31	45	40	„	La.	β−1·5, γ+4	8·2	
Aug. 2	47	t.22	„	Ni.	=β	8·0	
„ 4	49	„	„	„	β−1	8·1	
„ 7	52	45	„	Bh.	β+1	7·9	
„ 11	56	„	„	„	β−2	8·2	
„ 11	56	t.22	„	Ni.	β−3·5, ε+8	8·4	
„ 13	58	„	„	„	β−3·5, ε+8	8·4	
„ 15	60	„	„	„	β−5, ε+6·5	8·5	
„ 17	62	„	„	„	β−8, ε+4	8·8	
„ 18	63	40	„	La.	β−5, γ−2, δ+2	8·6	
„ 19	64	t.22	2	Ni.	β−8·5, ε+3	8·9	
„ 23	68	45	1	Br.	=β	8·0	
„ 23	68	„	„	Bh.	β−6, δ+2	8·6	
„ 24	69	40	„	La.	γ−3, δ+1, ε+5	8·8	
„ 31	0376	25	„	Wd.	β−4, δ+4	8·4	

(806) *o* (MIRA) CETI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Sept. 1	0377	T.94	1	Ni.	$\epsilon+5$	8·7	In t.22, 9·0.
,, 2	78	T.50	,,	Bn.	$\gamma-2$, $\delta+0·5$	8·8	
,, 3	79	t.22	,,	Ni.	$\beta-9$, $\epsilon+2·5$	8·9	
,, 5	81	90	,,	Bh.	$\delta+1$	8·7	
,, 6	82	T.94	,,	Ni.	$\beta-6·5$, $\epsilon+5$	8·7	
,, 11	87	,,	,,	,,	$\beta-6·5$, $\epsilon+5$	8·7	In t.22, 9·0.
,, 14	90	25	,,	Wd.	$\delta-2$, $\epsilon+2$	9·0	
,, 15	91	T.94	,,	Ni.	$\beta-8$, $\epsilon+3·5$	8·8	In t.22, 9·1.
,, 15	91	40	,,	La.	$\delta-1$, $\epsilon+2·5$	8·9	
,, 19	95	45	,,	Br.	$=\delta$	8·8	
,, 19	95	,,	,,	Bh.	$=\delta$	8·8	
,, 20	96	T.94	,,	Ni.	$\beta-9$, $\epsilon+2·5$	8·9	In t.22, 9·1.
,, 23	0399	,,	,,	,,	$\beta-9$, $\epsilon+2·5$	8·9	,, ,, 9·1.
,, 24	0400	40	,,	La.	$\epsilon+1$	9·1	
,, 25	01	T.94	,,	Ni.	$\beta-9·5$, $\epsilon+2$	9·0	In t.22, 9·1.
,, 27	03	45	,,	Bh.	$\delta-2$, $\epsilon+2$	9·0	
,, 28	04	25	,,	Wd.	$\delta-2$, $\epsilon+2$	9·0	
,, 29	05	40	,,	La.	$\delta-1$, $\epsilon+2·5$	8·9	
,, 30	06	45	,,	Br.	$\delta+1$	8·7	
,, 30	06	T.94	,,	Ni.	$\beta-10$, $\epsilon+2$	9·0	In t.22, 9·2.
Oct. 4	10	40	,,	Bc.	$=\gamma$, $\delta+2$	8·6	
,, 6	12	T.94	,,	Ni.	$\beta-9·5$, $\epsilon+2$	9·0	
,, 10	16	90	,,	Bh.	$\epsilon+2$	9·0	
,, 11	17	T.94	,,	Ni.	$\beta-9$, $\epsilon+2$	9·0	
,, 17	23	,,	2	,,	$\beta-8·5$, $\epsilon+3$	8·9	In t.22, 9·1.
,, 18	24	45	1	Bh.	$\epsilon+2$	9·0	
,, 19	25	25	,,	Wd.	$=\delta$	8·8	
,, 20	26	40	,,	Bc.	$\gamma-2$, $=\delta$	8·8	
,, 21	27	,,	,,	La.	$\delta-2$, $\epsilon+2$	9·0	
,, 22	28	25	,,	Wd.	$=\delta$	8·8	
,, 27	33	90	,,	Bh.	$\delta+2$, $\epsilon+5$	8·7	
Nov. 2	39	40	2	Hw.	$=\gamma$	8·6	
,, 3	40	90	1	Bh.	$\delta+2$, $\epsilon+5$	8·7	
,, 6	43	40	,,	Bc.	$\delta-1$, $\epsilon+3$	8·9	
,, 7	44	T.94	,,	Ni.	$\beta-9·5$, $\epsilon+2$	9·0	
,, 9	46	40	,,	La.	$\delta-1$, $\epsilon+2·5$	8·9	
,, 9	46	25	,,	Wd.	$=\delta$	8·8	
,, 10	47	60	,,	Br.	$\delta+2$	8·6	
,, 10	47	90	,,	Bh.	$\delta+1$, $\epsilon+4$	8·8	
,, 12	49	40	2	Hw.	$\delta-2$, $\epsilon+2$	9·0	
,, 12	49	T.94	1	Ni.	$\beta-6$, $\epsilon+6$	8·6	In t.22, 9·1.
,, 13	50	40	,,	La.	$\delta-1$, $\epsilon+2·5$	8·9	
,, 15	52	45	,,	Bh.	$\delta+3$, $\epsilon+6$	8·6	
,, 16	53	T.50	,,	Bn.	$\gamma-1·5$, $\delta+1$	8·7	
,, 16	53	T.94	,,	Ni.	$\beta-5$, $\epsilon+7$	8·5	In t.22, 9·0.
,, 20	57	25	,,	Wd.	$=\delta$	8·8	
,, 20	57	40	,,	Bc.	$=\epsilon$	9·2	
,, 22	59	T.94	,,	Ni.	$\beta-5$, $\epsilon+7$	8·5	In t.22, 9·0.
,, 22	59	45	,,	Bh.	$\beta-4$, $\epsilon+8$	8·4	
,, 26	63	25	,,	Wd.	$=\gamma$	8·6	
,, 27	64	60	2	Br.	$\beta-2$	8·2	
,, 27	64	40	3	Hw.	$\beta-5$, $\delta+3$	8·5	
,, 28	0465	45	1	Bh.	$\beta+3$	7·7	

(806) *o* (MIRA) CETI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Dec. 1	0468	t.22	1	Ni.	$\beta-2, \varepsilon+10$	8·2	Orange.
„ 2	69	25	„	Wd.	$=\beta$	8·0	
„ 3	70	t.22	„	Ni.	$\beta-1$	8·1	
„ 4	71	40	„	Bc.	$\beta-2, \gamma+4$	8·2	
„ 5	72	T.50	„	Bn.	$\alpha-5\cdot5, \beta+2$	7·8	
„ 5	72	40	„	Hw.	$\alpha-5, \beta+2$	7·8	
„ 5	72	t.22	„	Ni.	$\beta-3, \varepsilon+9$	8·3	
„ 6	73	40	„	La.	$\beta-2, \gamma+4, \delta+6$	8·2	
„ 7	74	45	„	Bh.	$\beta+8$	7·2	
„ 7	74	40	„	Th.	$=\beta$	8·0	
„ 8	75	„	„	Hw.	$\alpha-5, \beta+2$	7·8	
„ 11	78	25	„	Wd.	$=\alpha$	7·3	
„ 12	79	40	„	Bc.	$\alpha-5, \beta+2$	7·8	
„ 13	80	B.	2	Br.	$\alpha-2$	7·5	
„ 14	81	t.22	1	Ni.	$z-1\cdot5, \alpha+5$	6·8	In B. 7·2.
„ 15	82	20	„	La.	$y-4, z+2$	6·6	Orange.
„ 16	83	B.	„	Br.	$y-6, \alpha+3$	7·0	
„ 16	83	„	„	Bn.	$y-6, \alpha+3$	7·0	
„ 16	83	25	„	Wd.	$y-3, \alpha+6$	6·7	
„ 19	86	45	„	Bh.	$x-2, y+1$	6·3	
„ 19	86	20	„	La.	$u-3, =w, x+1\cdot5$	5·9	
„ 20	87	B.	„	Br.	$y-3$	6·7	
„ 20	87	„	„	Ni.	$y-1, z+2$	6·5	
„ 21	88	40	„	Hw.	$y-4, \alpha+6$	6·7	
„ 21	88	B.	2	Ni.	$N-4\cdot5, y+3$	6·1	
„ 23	90	45	„	Bh.	$q-5, x+5$	5·5	
„ 23	90	B.	1	Ga.	$t-3, u-3, x+2, y+2$	6·0	
„ 23	90	40	„	La.	$=s, =t$	5·5	
„ 24	91	B.	„	Ni.	$N-3, y+4$	5·9	
„ 25	92	„	„	„	$t-1, =N$	5·6	
„ 26	93	45	2	Bh.	$q-5, =r$	5·3	
„ 27	94	20	1	La.	$r-2, s+1, t+5$	5·2	
„ 29	96	45	2	Bh.	$=q, r+3, s+5$	4·9	
„ 30	97	B.	1	Ni.	$=r$	5·1	
„ 31	0498	„	„	Br.	$=R$	4·8	

(1855) R AURIGÆ. (V. 1.)

H.D. 050953.

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Jan. 10	8682	160	2	Br.	23+4	10·3	
„ 11	83	T.94	1	Ni.	=20	10·5	
„ 20	8692	160	„	Br.	14−1, 23+3	10·4	
„ 30	8702	T.94	„	Ni.	8−5, 14+5	9·8	
„ 30	8702	T.95	„	Bn.	8−1, 10+1	9·4	

(1855) R AURIGÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Feb. 4	8707	T.95	1	Bn.	=10, 12+1	9·6	
,, 8	11	T.50	,,	,,	8−1, 10+1	9·4	
,, 9	12	T.94	,,	Ni.	=8	9·3	
,, 11	14	160	,,	Br.	4−3, 8+2	9·1	
,, 21	24	,,	,,	,,	4−1, 8+3	9·0	
,, 21	24	T.94	,,	Ni.	4−2, 8+2	9·1	Yellowish orange.
,, 27	30	79	2	Ma.	8−0·5	9·3	
,, 28	31	50	,,	,,	8−1	9·4	
Mar. 1	32	160	1	Br.	=4	8·8	
,, 3	34	T.94	,,	Ni.	4−2, 8+2	9·1	Yellowish orange.
,, 3	34	50	,,	Ma.	8+1	9·2	
,, 4	35	,,	,,	,,	8+0·5	9·2	
,, 8	39	160	,,	Br.	=4	8·8	
,, 13	44	T.94	,,	Ni.	=4	8·8	
,, 13	44	50	2	Ma.	8+2	9·1	
,, 14	45	79	1	,,	4−4, 8+0·5	9·2	
,, 15	46	160	,,	Br.	=4	8·8	
,, 19	50	50	,,	Ma.	4+2·5, 8+7	8·6	
,, 20	51	T.94	,,	Ni.	4+1	8·7	
,, 22	53	50	2	Ma.	4−0·5, 8+4	8·9	Ruddy.
,, 22	53	T.50	1	Bn.	4+2, 5+1	8·6	
,, 25	56	79	,,	Ma.	4+0·5	8·8	Ruddy.
,, 27	58	,,	,,	,,	4−0·5, 8+4	8·9	
,, 27	58	T.50	,,	Bn.	3−5, 5+0·5	8·7	
,, 29	60	,,	,,	,,	3−4, 5+1·5	8·6	
,, 30	61	T.94	,,	Ni.	3−4·5, 4+2	8·6	Yellowish orange.
,, 31	62	80	,,	Br.	=3	8·2	
Apr. 1	63	50	,,	Ma.	4−0·5, 8+4	8·9	
,, 1	63	T.50	,,	Bn.	3−4, 5+1·5	8·6	
,, 2	64	,,	,,	,,	3−4, 5+1·5	8·6	
,, 8	70	79	,,	Ma.	=4	8·8	
,, 10	72	,,	,,	,,	4+1	8·7	
,, 11	73	T.94	,,	Ni.	3−1, 4+5	8·3	Orange yellow.
,, 21	83	40	,,	Hw.	3+1	8·1	
,, 24	86	79	,,	Ma.	3−0·5, 4+6	8·2	
,, 24	86	T.94	,,	Ni.	3−1, 4+6	8·2	Orange yellow.
,, 25	87	45	,,	Br.	2−1, 3+3	7·9	
,, 25	87	50	2	Ma.	3+1	8·1	
,, 26	88	,,	1	,,	3+1	8·1	Ruddy.
,, 26	88	40	,,	Hw.	3+1·5, 4+8	8·0	
May 3	95	T.94	2	Ni.	=d	7·7	Yellow.
,, 7	99	79	1	Ma.	3+2·5	7·9	
,, 7	99	45	,,	Br.	=2, 3+2	7·9	
,, 7	8799	T.50	,,	Bn.	2−2, 3+1	8·0	
,, 12	8804	T.94	,,	Ni.	=d	7·7	Yellowish orange.
,, 12	04	t.60	,,	Bn.	3−1, 4+4·5	8·3	
,, 14	06	T.50	,,	,,	3−0·5	8·2	
,, 15	07	t.30	,,	,,	3−1·5, 5+4	8·3	
,, 18	10	60	,,	Br.	=2, 3+4	7·8	
,, 22	14	T.95	,,	Bn.	3−2, 5+3·5	8·4	
,, 29	8821	60	,,	Br.	3+1	8·1	

(1855) R AURIGÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
June 3	8826	T.94	1	Ni.	d−6, 4+5	8·3	Orange yellow.
„ 13	36	60	„	Br.	3+1	8·1	
July 1	54	T.94	„	Ni.	3−5, 4+1	8·7	
„ 11	64	160	„	Br.	4−3, 8+1	9·2	
„ 16	69	T.94	„	Ni.	4+1	8·7	Yellowish orange.
„ 22	75	132	„	F.G.B.	=8	9·3	Dull red.
„ 28	81	T.94	„	Ni.	8−0·5	9·3	Yellowish orange.
„ 31	84	160	2	Br.	8−5	9·8	
„ 31	84	66	„	F.G.B.	8−3, 14+6	9·6	
Aug. 6	90	„	1	„	12−2, 14+4	9·9	
„ 9	93	T.94	„	Ni.	8−3, 14+6	9·6	
„ 10	8894	160	„	Br.	14−2, 23+2·5	10·4	
„ 20	8904	45	„	„	12−6, 23+2·5	10·4	
„ 29	13	T.94	„	Ni.	=23	10·7	
„ 31	15	160	„	Br.	14−7, 23+2, 25+5	10·7	
Sept. 3	18	66	„	F.G.B.	=23	10·7	
„ 17	32	160	„	Br.	23−4, =25, 26+4	11·1	
„ 20	35	66	„	F.G.B.	25−2, 26+2	11·3	
„ 21	36	T.94	„	Ni.	=26	11·5	
„ 27	42	66	„	F.G.B.	26−6, 37+3	12·1	
„ 27	42	120	„	Gh.	=25	11·1	
„ 30	45	T.94	„	Ni.	26−2, 29+2	11·7	
Oct. 6	51	T.120	„	Bn.	27−1, =31	12·1	
„ 7	52	120	2	Gh.	=25	11·1	Doubtful. [C.L.B.]
„ 13	58	T.94	1	Ni.	26−3, 29+1	11·8	
„ 14	59	160	„	Br.	26−4, 31+3	11·9	
„ 24	69	T.94	„	Ni.	=31	12·1	
„ 28	73	66	„	F.G.B.	28−1, 31+1	12·0	
Nov. 1	77	198	„	„	=41	12·7	
„ 1	77	90	2	Hw.	26−6, 31+1	12·1	
„ 2	78	T.200	1	Bn.	43−1	12·9	
„ 4	80	240	„	Br.	41−1, 43+1	12·8	
„ 7	83	T.94	„	Ni.	=37	12·4	
„ 7	83	90	2	Hw.	26−6, =31	12·1	
„ 11	87	240	1	Br.	=43	12·8	
„ 16	92	198	„	F.G.B.	=43	12·8	
„ 20	96	240	„	Br.	43−1	12·9	
„ 21	97	T.94	„	Ni.	37−1·5, 43+3	12·5	
„ 21	97	90	2	Hw.	26−8, 31−1·5	12·3	
„ 22	8998	T.167	„	Bn.	43−3	13·1	
„ 25	9001	90	1	Hw.	26−9, 31−3	12·4	
„ 29	05	240	„	Br.	=43	12·8	
Dec. 6	12	198	„	F.G.B.	43−1·5, 46+3	13·0	
„ 7	13	T.94	„	Ni.	=37	12·4	
„ 19	25	90	„	Hw.	34−1, =39	12·5	
„ 20	26	160	„	Br.	=37	12·4	
„ 22	28	T.120	2	Bn.	43−2	13·0	
„ 24	30	T.94	1	Ni.	31−1·5, 37+1	12·3	
„ 26	32	198	„	F.G.B.	43−1·5, 46+3	13·0	
„ 28	9034	120	„	Gh.	<29	<11·9	

(1855) R AURIGÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
Jan. 1	9038	240	1	Br.	=43	12·8	
,, 6	43	198	,,	F.G.B.	=41	12·7	
,, 9	46	240	,,	Br.	43+1	12·7	
,, 13	50	T.94	2	Ni.	26−2·5, 29+1	11·7	
,, 23	60	160	1	Br.	31−1, 43+4	12·3	
,, 27	64	90	2	Hw.	31−1, 39+2·5	12·3	
,, 28	65	66	1	F.G.B.	26−2, 28+1	11·7	
,, 29	66	T.94	,,	Ni.	23−6, 26+2	11·3	
,, 30	67	T.120	,,	Bn.	=27	11·9	
,, 31	68	60	,,	Gh.	25−4, =26, 29+4	11·5	
Feb. 9	77	T.94	,,	Ni.	20−1, 23+1·5	10·5	
,, 11	79	45	,,	Br.	16−3, 23+3	10·3	
,, 20	88	T.95	,,	Bn.	23−2, 26+5	10·9	
,, 22	90	66	,,	F.G.B.	=25	11·1	
,, 22	90	60	,,	Gh.	=23	10·7	
,, 25	93	45	,,	Br.	=14, =16	10·1	
,, 25	93	T.94	,,	Ni.	=14	10·3	
,, 28	96	T.95	,,	Bn.	14−1, =20	10·4	
Mar. 2	9098	T.120	,,	,,	14−1, =20	10·4	
,, 4	9100	160	,,	Br.	8−1	9·4	
,, 4	00	90	2	Hw.	14−5, 26+7·5	10·7	
,, 5	01	T.94	1	Ni.	14−0·5	10·3	
,, 7	03	66	,,	F.G.B.	12−4, 14+2	10·1	
,, 7	03	T.95	,,	Bn.	14−1, =20	10·4	
,, 19	15	T.94	2	Ni.	8−5, 14+5	9·8	
,, 21	17	T.120	1	Bn.	8−1, =10	9·5	
,, 24	20	90	,,	Hw.	=14	10·3	
,, 25	21	T.50	,,	Bn.	=8, 10+1	9·4	
,, 31	27	T.94	,,	Ni.	8−5 14+5	9·8	Orange.
,, 31	27	T.95	,,	Bn.	10−1	9·6	
Apr. 3	30	T.120	,,	,,	10−1	9·6	
,, 3	30	160	,,	Br.	4−2, 8+2	9·1	
,, 6	33	T.94	,,	Ni.	4−4, 8+1	9·2	Yellowish orange.
,, 6	33	90	,,	Hw.	4−6, 8−1	9·4	
,, 11	38	160	,,	Br.	4−3, 8+2	9·1	
,, 11	38	66	,,	F.G.B.	9−2, 12+1	9·6	
,, 15	42	90	,,	Hw.	4−5, =8	9·3	
,, 16	43	t.75	,,	Bn.	8−1, 10+1	9·4	
,, 19	46	66	,,	F.G.B.	=8	9·3	
,, 19	46	T.94	,,	Ni.	4−3, 8+1·5	9·1	Yellowish orange.
,, 20	47	t.85	,,	Bn.	8−1, 10+1	9·4	
,, 26	53	90	2	Hw.	4−6, 8−1	9·4	
,, 30	57	T.94	1	Ni.	4−1, 8+4	8·9	Orange.
,, 30	57	160	,,	Br.	4−1·5, 8+3	9·0	
May 6	63	45	,,	F.G.B.	4−1·5, 8+3	9·0	
,, 8	65	T.50	,,	Bn.	5−3·5, 8+2	9·1	
,, 9	66	45	,,	Br.	4−2, 8+3	9·0	
,, 9	66	90	,,	Hw.	4−3, 8+1·5	9·1	
,, 10	67	45	,,	F.G.B.	=4	8·8	
,, 14	71	66	,,	,,	4−1, 8+4	8·9	
,, 21	78	160	2	Br.	4−3, 8+2	9·1	
,, 21	9178	T.94	1	Ni.	4+1·5	8·7	Yellowish orange.

(1855) R AURIGÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
May 22	9179	200	1	Hw.	4−3, 8+2	9·1	
,, 24	81	45	,,	F.G.B.	3−4, 4+2	8·6	
,, 24	81	T.50	,,	Bn.	=4, =5	8·8	
,, 27	84	,,	,,	,,	4+1, =5	8·7	
,, 28	85	160	,,	Br.	4−1, 8+4	8·9	
,, 29	86	T.94	,,	Ni.	3−5, 4+1	8·7	
,, 31	88	60	,,	Bi.	3−4, 4+2	8·6	Pinkish red.
June 3	9191	,,	2	,,	3−4, 4+2	8·6	
,, 13	9201	T.94	,,	Ni.	3−5, 4+2	8·6	
,, 18	06	160	1	Br.	=3	8·2	
July 2	20	T.94	,,	Ni.	3−2·5, 4+4	8·4	Orange.
,, 10	28	45	,,	F.G.B.	=3	8·2	
,, 12	30	T.94	,,	Ni.	=d, =3	7·9	
,, 21	39	45	,,	F.G.B.	2+1	7·7	
,, 21	39	60	,,	Br.	2−1, 3+2	7·9	
,, 21	39	30	,,	Gh.	2−5, =3, 4+5	8·3	
,, 30	48	T.94	,,	Ni.	3−1, 4+6	8·2	Yellowish orange.
,, 30	48	60	2	Gh.	=3	8·2	
,, 31	49	30	1	,,	=2	7·8	
Aug. 1	50	160	,,	Br.	3+1·5	8·0	
,, 12	61	T.94	,,	Ni.	3+1	8·1	
,, 13	62	60	,,	Gh.	=3	8·2	
,, 15	64	45	,,	F.G.B.	2−1, 3+2	7·9	
,, 23	72	T.94	,,	Ni.	3−2, 4+4·5	8·4	
,, 24	73	45	,,	F.G.B.	=3	8·2	
,, 24	73	160	,,	Br.	=3	8·2	
,, 25	74	30	,,	Gh.	=3	8·2	
Sept. 2	82	60	,,	,,	3−5, 4+1	8·7	
,, 6	86	160	,,	Br.	=3	8·2	
,, 15	95	60	,,	Gh.	=4	8·8	
,, 17	97	160	,,	Br.	3−4, 4+3	8·5	
,, 18	9298	90	,,	Hw.	3−6, 8+6	8·7	
,, 20	9300	45	,,	F.G.B.	=4	8·8	
,, 22	02	T.94	,,	Ni.	3−3·5, 4+3	8·5	Orange.
,, 24	04	30	,,	Gh.	=4	8·8	
Oct. 1	11	45	,,	F.G.B.	4−4, 8+0·5	9·2	
,, 1	11	T.94	,,	Ni.	3−4, 4+2·5	8·6	
,, 1	11	T.50	,,	Bn.	3−1·5, 5+4	8·3	
,, 6	16	90	,,	Hw.	4−2, 8+2	9·1	
,, 10	20	,,	2	,,	4−1·5, 8+3	9·0	
,, 11	21	T.94	1	Ni.	3−5, 4+1·5	8·7	Yellowish orange.
,, 17	27	30	,,	Gh.	=8	9·3	
,, 21	31	132	,,	F.G.B.	8−1·5, 12+3	9·4	
,, 21	31	160	,,	Br.	8−4, 12+1	9·7	
,, 25	35	T.50	,,	Bn.	5−4, 8+1·5	9·1	
,, 25	35	30	,,	Gh.	=8	9·3	
,, 26	36	T.94	,,	Ni.	=8	9·3	Yellowish orange.
,, 28	38	T.95	,,	Bn.	5−4·5, 8+1	9·2	
,, 28	38	90	2	Hw.	10−6, 14+1·5	10·1	
,, 30	40	T.95	1	Bn.	8+1	9·2	
,, 30	9340	160	,,	Br.	=14	10·3	

(1855) R AURIGÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
Oct. 30	9340	60	1	Gh.	=9	9·4	
„ 31	41	132	„	F.G.B.	14−0·5, 20+1	10·3	
Nov. 6	47	„	„	„	14−2, 23+2	10·5	
„ 7	48	T.94	„	Ni.	8−6, 14+3	9·9	
„ 12	53	60	„	Gh.	=20	10·5	
„ 12	53	t.100	„	Bn.	14−2, 23+1	10·5	
„ 18	59	105	„	F.G.B.	=23	10·7	
„ 20	61	160	„	Br.	23+1	10·6	
„ 21	62	T.94	2	Ni.	20−1, 23+1	10·6	
Dec. 4	75	160	1	Br.	23−2, 25+2	10·9	
„ 9	80	T.94	„	Ni.	23−3, 26+5	11·0	
„ 9	80	132	„	F.G.B.	23−4, 26+4	11·1	
„ 9	80	120	„	Gh.	=25	11·1	
„ 15	86	160	„	Br.	26−2, 34+4	11·7	
„ 15	86	90	2	Hw.	22−2, 26+2	11·3	
„ 20	91	132	1	F.G.B.	26−7, 37+1·5	12·2	
„ 20	91	T.95	„	Bn.	23−6, 26+1	11·3	
„ 24	9395	T.94	2	Ni.	=29	11·9	
1912.							
Jan. 5	9407	132	1	F.G.B.	26−6, 37+3	12·1	
„ 5	07	160	„	Br.	26−5, 31+1	12·0	
„ 7	09	T.94	2	Ni.	29−0·5, 31+2	11·9	
„ 21	23	160	„	Br.	31−3, 43+3	12·5	
„ 26	28	T.94	1	Ni.	37−1·5, 43+3	12·5	
„ 27	29	198	„	F.G.B.	37−2, 41+1	12·6	
„ 27	29	T.120	„	Bn.	43−3	13·1	
Feb. 8	41	132	„	F.G.B.	43−2, 46+2	13·1	
„ 9	42	T.94	„	Ni.	43+0·5	12·8	
„ 19	52	160	„	Br.	43−2, 46+2	13·1	
„ 21	54	T.94	„	Ni.	37−2, 43+2	12·6	
Mar. 5	67	160	„	Br.	43−1	12·9	
„ 7	69	132	„	F.G.B.	43−2, 46+2	13·1	
„ 7	69	T.94	„	Ni.	37−3, 43+1	12·7	
„ 7	69	T.200	„	Bn.	41−1, =43	12·8	
„ 10	72	T.150	„	„	43−2	13·0	
„ 19	81	320	„	Br.	=43	12·8	
„ 19	81	T.94	„	Ni.	37−3, 43+1	12·7	
Apr. 3	9496	„	„	„	37−2, 43+2	12·6	
„ 11	9504	„	„	„	37+0·5	12·3	
„ 13	06	160	„	Br.	26−6, 34+3	12·1	
„ 16	09	132	2	F.G.B.	=31	12·1	
„ 19	12	„	1	„	26−6, 37+3	12·1	
„ 19	12	120	„	Gh.	26−5, =31, 34+3	12·1	
„ 23	16	T.94	„	Ni.	29−1, 31+1	12·0	
„ 25	18	132	2	F.G.B.	26−4, 37+4	11·9	
„ 30	23	T.94	1	Ni.	23−6, 26+1·5	11·3	
May 13	36	„	„	„	20−2, 23+0·5	10·6	
„ 16	9539	132	„	F.G.B.	=26	11·5	

(1855) R AURIGÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
May 20	9543	132	2	F.G.B.	=25	11·1	
„ 23	46	T.94	1	Ni.	20−1·5, 23+1	10·6	
June 10	64	120	„	Gh.	=14	10·3	
„ 13	67	160	2	Br.	=12	9·7	About. Doubtful.
„ 18	72	T.94	„	Ni.	=14	10·3	
July 12	9596	„	1	„	14−1, 20+0·5	10·4	
„ 23	9607	„	„	„	14−0·5, 20+1	10·3	
Aug. 2	17	„	„	„	=8	9·3	
„ 18	33	„	„	„	8−3, 14+7	9·6	
Sept. 2	48	45	„	Br.	4−1	8·9	
„ 4	50	T.94	„	Ni.	4−2, 8+3	9·0	Yellowish orange.
„ 5	51	40	2	Hw.	=8	9·3	
„ 12	58	T.94	1	Ni.	=4	8·8	Orange yellow.
„ 17	63	160	„	Br.	3−4, 4+2	8·6	
„ 22	68	T.94	„	Ni.	3−4, 4+3	8·5	
Oct. 3	79	„	„	„	3−2·5, 4+4	8·4	Orange yellow.
„ 4	80	T.50	„	Bn.	=3	8·2	
„ 8	84	90	3	Hw.	3−3, 4+3	8·5	
„ 10	86	160	1	Br.	3−2, 4+5	8·3	
„ 10	86	T.50	„	Bn.	=3	8·2	
„ 14	90	„	„	„	3−1, 5+4·5	8·3	
„ 17	9693	T.94	2	Ni.	3−2·5, 4+4	8·4	Orange yellow.
„ 29	9705	45	1	Br.	3−2, 4+5	8·3	
„ 29	05	90	2	Hw.	3+0·5, 4+7	8·1	
Nov. 3	10	T.94	1	Ni.	3−4, 4+3	8·5	
„ 11	18	160	„	Br.	=3	8·2	
„ 11	18	90	„	Hw.	3−6, 8+6	8·7	
„ 24	31	T.94	„	Ni.	3−4, 4+2	8·6	
„ 30	37	40	2	Hw.	3−10, 8+1	9·2	
„ 30	37	T.50	1	Bn.	5−4, 8+1·5	9·1	
Dec. 3	40	T.94	„	Ni.	4+1	8·7	
„ 4	41	160	„	Br.	4−2, 8+3	9·0	
„ 12	49	T.94	„	Ni.	3−5·5, 4+1	8·7	
„ 12	49	90	2	Hw.	=8	9·3	
„ 12	49	T.50	1	Bn.	5−3, 8+3	9·0	Very red.
„ 16	53	T.95	„	„	5−4·5, 8+1	9·2	
„ 18	55	„	„	„	5−2, 8+4	8·9	
„ 20	57	T.94	„	Ni.	4+1	8·7	Orange.
„ 24	61	160	„	Br.	=4	8·8	
„ 29	66	30	„	Gh.	=12	9·7	
„ 29	66	T.95	2	Bn.	8−1, =10	9·5	
„ 30	67	T.94	1	Ni.	4−3, 8+2	9·1	Orange.
1913.							
Jan. 2	70	45	„	Br.	4−2, 8+3	9·0	
„ 5	73	T.95	„	Bn.	10−1, =12	9·7	
„ 8	76	T.94	„	Ni.	=8	9·3	
„ 12	9780	T.95	„	Bn.	12−1, 16+1	9·9	

(1855) R AURIGÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Jan. 15	9783	T.94	1	Ni.	8−1	9·4	
„ 18	86	160	„	Br.	8−1	9·4	
„ 26	94	T.94	„	Ni.	=14	10·3	
„ 31	9799	T.95	„	Bn.	20−3, 22+2	10·8	
Feb. 5	9804	160	„	Br.	14−3, 23+1·5	10·5	
„ 8	07	T.94	„	Ni.	20−1, 23+1	10·6	
„ 17	16	„	„	„	20−1·5, 23+1	10·6	
„ 21	20	160	„	Br.	=25	11·1	
Mar. 6	33	120	„	Th.	24−2, 26+0·5	11·4	
„ 7	34	160	„	Br.	26−3, 31+4	11·8	
„ 8	35	T.94	„	Ni.	26−2·5, 29+1	11·7	
„ 8	35	79	„	Ma.	14+1, 16+2	10·0	Erroneous. [C.L.B.]
„ 10	37	120	2	Th.	=26	11·5	
„ 11	38	„	1	„	26−2, 28+2	11·7	
„ 11	38	T.120	„	Bn.	37+1	12·3	
„ 20	47	79	„	Ma.	=25, =26	11·3	
„ 23	50	T.167	„	Bn.	37−1	12·5	
„ 23	50	T.94	„	Ni.	29−2, 31+2	12·0	
„ 27	54	183	„	Ma.	31+2, 34+2, 39+2	12·1	
„ 28	55	160	„	Br.	31−1, 34+1	12·2	
Apr. 1	59	183	„	Ma.	41+2	12·5	
„ 1	59	120	2	Th.	26−4, 31+2, 37+4	11·9	
„ 2	60	T.94	„	Ni.	31−1, 37+1	12·3	
„ 4	62	120	1	Th.	26−6, 28−1, 31+1, 37+2	12·1	
„ 5	63	155	„	„	=31	12·1	
„ 12	70	„	2	„	=34, 43+5	12·3	
„ 16	74	183	„	Ma.	=37	12·4	
„ 17	75	210	„	Th.	=39	12·5	
„ 19	77	„	1	„	26−6, 37+2	12·1	
„ 22	80	183	2	Ma.	41+1·5, 43+1	12·6	
„ 27	85	T.94	„	Ni.	37−2, 43+2	12·6	
„ 28	86	120	1	Br.	37−3, 43+2	12·6	
May 1	89	T.200	„	Bn.	43−1	12·9	
„ 2	90	183	„	Ma.	43−1	12·9	
„ 6	94	„	„	„	=43	12·8	
„ 9	97	120	2	Br.	37−2, 43+2	12·6	
„ 11	9899	T.94	„	Ni.	=43	12·8	About.
„ 17	9905	300	3	Th.	43−2	13·0	
„ 25	13	T.94	1	Ni.	43−1	12·9	
„ 27	15	120	2	Br.	43+2	12·6	
„ 30	18	„	„	Gh.	<25	<11·1	Not seen.
July 10	59	T.94	1	Ni.	26−2, 29+1·5	11·7	
„ 16	65	„	„	„	23−6, 26+2	11·3	
Aug. 2	82	120	2	Th.	16−3	10·3	
„ 2	9982	160	1	Br.	14−3, 23+1·5	10·5	
„ 21	0001	T.94	„	Ni.	14−1·5, =20	10·4	
„ 24	04	„	„	„	8−4, 14+6	9·7	
„ 25	0005	160	„	Br.	=14	10·3	

(1855) R AURIGÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Sept. 3	0014	62	2	Th.	8−2	9·5	
„ 6	17	T.94	1	Ni.	=8	9·3	
„ 7	18	120	„	Br.	=8	9·3	
„ 7	18	T.95	„	Bn.	=8	9·3	
„ 8	19	90	2	Hw.	8−3, 16+4·5	9·6	
„ 11	22	120	3	Th.	=10	9·5	Doubtful.
„ 15	26	T.94	1	Ni.	4−3, 8+1·5	9·1	
„ 17	28	155	3	Th.	8+0·5	9·2	
„ 21	32	62	2	„	4−3, 8+1·5	9·1	
„ 24	35	155	1	„	4−1·5, 8+3	9·0	
„ 24	35	160	„	Br.	8−1	9·4	
„ 27	38	T.94	„	Ni.	4−2·5, 8+2	9·1	
„ 27	38	T.95	„	Bn.	5−5, 8+1	9·2	
„ 27	38	120	„	Th.	4−4, 8+1	9·2	
„ 30	41	79	„	Ma.	4−1·5, 8+3	9·0	Ruddy.
Oct. 9	50	T.94	„	Ni.	4−2, 8+3	9·0	
„ 9	50	155	„	Th.	=4	8·8	
„ 16	57	40	3	Hw.	4−1, 8+4	8·9	
„ 18	59	120	1	Th.	4−1, 8+4	8·9	Deep red.
„ 22	63	160	„	Br.	8−1	9·4	
„ 22	63	90	2	Hw.	= 8	9·3	
„ 25	66	T.94	1	Ni.	4−1, 8+3·5	8·9	
„ 25	66	79	„	Ma.	4−4, 8+1	9·2	Deep red.
„ 29	70	155	2	Th.	8+2	9·1	
Nov. 1	73	40	„	Hw.	=8	9·3	
„ 3	75	160	1	Br.	4−2, 8+2	9·1	
„ 11	83	T.94	„	Ni.	4−3, 8+1	9·2	
„ 12	84	155	„	Th.	4−2, 8+2	9·1	
„ 14	86	90	3	Hw.	=8	9·3	
„ 17	89	62	2	Th.	4−2, 8+2	9·1	
„ 22	94	120	1	„	4−3, 8+1	9·2	
„ 22	94	T.95	„	Bn.	5−4·5, 8+1	9·2	
„ 22	94	T.94	„	Ni.	4−3, 8+1	9·2	
„ 22	0094	160	„	Br.	4−1, 8+3	9·0	
„ 29	0101	90	2	Hw.	8−1, 10+1	9·4	
Dec. 6	08	155	„	Th.	4−1, 8+3·5	8·9	
„ 6	08	60	1	Tn.	4−3, 8+1·5	9·1	
„ 7	09	T.94	„	Ni.	4−2, 8+2	9·1	
„ 9	11	62	„	Th.	=4	8·8	
„ 12	14	„	„	„	3−4·5, 4+2, 5+2	8·6	
„ 14	16	T.50	„	Bn.	=4, 5−1, 8+4·5	8·8	Red.
„ 16	18	45	„	Br.	3−5, 4+3	8·6	
„ 16	18	62	2	Th.	3−4, 4+2, 5+2	8·6	
„ 16	18	30	1	Tn.	4−1, 8+3·5	8·9	
„ 18	20	„	„	„	4−1·5, 8+3	9·0	
„ 18	20	T.94	„	Ni.	4+1·5	8·7	
„ 20	22	62	2	Th.	3−3, 4+3	8·5	
„ 23	25	45	1	Br.	3−4, 4+2	8·6	
„ 24	26	60	„	Tn.	=4	8·8	
„ 27	29	79	2	Ma.	8+2	9·1	
„ 27	29	145	„	Th.	3−5, 4+1·5	8·7	
„ 28	30	60	1	Tn.	=4	8·8	
„ 28	0130	T.50	„	Bn.	3−4·5, 5+1	8·6	

(1855) R AURIGÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Dec. 29	0131	60	1	Tn.	=4	8·8	
„ 30	32	T.94	„	Ni.	4+2	8·6	
„ 31	33	T.50	„	Bn.	3−4, 4+2, 5+1·5	8·6	
„ 31	33	60	„	Tn.	3−4, 4+2	8·6	
1914.							
Jan. 2	35	45	„	Br.	3−2, 4+4	8·4	
„ 5	38	62	„	Th.	3−1·5, 4+5	8·3	
„ 5	38	T.50	„	Bn.	3−4, 4+2, 5+1	8·6	
„ 6	39	62	„	Th.	3−4	8·6	
„ 6	39	30	2	Tn.	3−3, 4+3	8·5	
„ 11	44	T.94	1	Ni.	3−4, 4+2·5	8·6	
„ 14	47	24	„	Bo.	=3	8·2	
„ 14	47	60	„	Tn.	3+1	8·1	
„ 17	50	T.94	„	Ni.	3−2·5, 4+4	8·4	Yellowish orange.
„ 17	50	30	„	Tn.	2−3, 3+1	8·1	
„ 18	51	79	„	Ma.	3+2	8·0	
„ 21	54	24	2	Bo.	=3	8·2	
„ 22	55	60	1	Th.	3−1	8·3	
„ 23	56	„	„	„	3−0·5	8·2	
„ 23	56	T.50	„	Bn.	3+3	7·9	
„ 23	56	160	„	Br.	3+2	8·0	
„ 24	57	24	2	Bo.	2−3, 3+0·5	8·1	
„ 26	59	75	„	Ch.	=3	8·2	
„ 26	59	40	1	Th.	2+1	7·7	
„ 30	63	T.94	2	Ni.	3−1, 4+5	8·3	
„ 31	64	24	„	Bo.	2−2, 3+2	8·0	
Feb. 1	65	145	„	Th.	3+2	8·0	
„ 2	66	T.50	1	Bn.	2−2, 3+1	8·0	
„ 2	66	75	2	Ch.	3−1	8·3	
„ 3	67	24	1	Bo.	2−3, 3+1	8·1	
„ 4	68	40	„	Th.	2−2, 3+2	8·0	
„ 5	69	T.94	„	Ni.	3+0·5	8·1	Orange yellow.
„ 5	69	75	2	Ch.	3−1, 4+5	8·3	
„ 8	72	62	1	Th.	3+3	7·9	
„ 10	74	40	„	„	2−2, 3+2	8·0	
„ 12	76	T.94	„	Ni.	3+1	8·1	Orange yellow.
„ 15	79	75	2	Ch.	3−1, 4+5	8·3	
„ 15	79	T.50	1	Bn.	3+2	8·0	
„ 16	80	62	„	Th.	3+1	8·1	
„ 17	81	24	„	Bo.	2−3, 3+1	8·1	
„ 18	82	79	„	Ma.	3−3, 4+3	8·5	Red.
„ 18	82	40	„	Th.	=3	8·2	
„ 18	82	45	„	Br.	=2, 3+3	7·8	
„ 21	85	157	„	Th.	3+1	8·1	
„ 22	86	T.50	„	Bn.	3−1·5, 5+4	8·3	Very red.
„ 23	87	24	„	Bo.	2−3, 3+1	8·1	
„ 26	90	75	„	Ch.	3−6, 4+0·5	8·8	Red.
„ 26	90	79	„	Ma.	3−4, 4+2·5	8·6	Reddish.
„ 28	92	24	2	Bo.	2−3, 3+0·5	8·1	
Mar. 1	93	T.94	1	Ni.	3−2·5, 4+4	8·4	
„ 1	93	45	„	Br.	=2, 3+3	7·8	
„ 2	0194	79	„	Ma.	3−4, 4+2	8·6	

(1855) R AURIGÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Mar. 6	0198	79	I	Ma.	3−2, 4+4	8·4	Red.
„ 7	0199	24	„	Bo.	3−I, 4+5	8·3	
„ 10	0202	75	2	Ch.	3−6, 4+0·5	8·8	
„ 10	02	30	I	Tn.	3−I, 4+5	8·3	
„ 11	03	T.94	„	Ni.	3−4, 4+2·5	8·6	
„ 11	03	90	„	Hw.	3−4, 4+2·5	8·6	
„ 12	04	60	„	Tn.	3−2, 4+4·5	8·4	
„ 15	07	75	„	Ch.	=4	8·8	
„ 16	08	T.50	„	Bn.	3−4, 5+I·5	8·6	
„ 16	08	79	„	Ma.	3−5, 4+I·5	8·7	Red.
„ 16	08	160	„	Br.	3−I	8·3	
„ 16	08	60	„	Tn.	3−4, 4+2·5	8·6	
„ 19	II	75	„	Ch.	=4	8·8	
„ 21	13	T.50	„	Bn.	3−3·5, 5+2	8·5	Very red.
„ 21	13	79	„	Ma.	4+I	8·7	
„ 22	14	60	„	Tn.	3−4·5, 4+2	8·6	
„ 22	14	T.94	„	Ni.	3−4·5, 4+2	8·6	
„ 24	16	60	„	Tn.	=4	8·8	
„ 27	19	T.50	„	Bn.	3−4·5, 5+I	8·6	
„ 27	19	79	2	Ma.	4−2, 8+2·5	9·0	Dull red.
„ 27	19	160	I	Br.	3−4, 4+2	8·6	
„ 27	19	60	„	Tn.	4−I, 6+3·5	8·9	
„ 28	20	24	„	Bo.	3−5, 4+I·5	8·7	
„ 31	23	79	„	Ma.	4−2, 8+2·5	9·0	
„ 31	23	T.50	„	Bn.	4−I	8·9	
Apr. 4	27	T.94	„	Ni.	4+0·5	8·8	
„ 7	30	79	„	Ma.	4−2·5, 8+2	9·I	
„ 8	31	60	2	Tn.	4−I, 10+5	9·0	
„ 11	34	„	I	„	4−I, 8+3	9·0	
„ 11	34	79	2	Ma.	4−4, 8+0·5	9·2	Reddish.
„ 12	35	75	I	Ch.	5−I, 8+4·5	8·8	
„ 12	35	24	2	Bo.	5−3, 8+3	9·0	
„ 14	37	T.94	I	Ni.	4−I·5, 8+3	9·0	
„ 14	37	183	„	Ma.	4−I, 8+3	9·0	
„ 14	37	60	„	Tn.	4−2, 8+2	9·I	
„ 15	38	160	„	Br.	4−3, 8+I	9·2	
„ 17	40	183	„	Ma.	8+0·5	9·2	Dull red.
„ 18	41	„	„	„	=8	9·3	
„ 18	41	60	„	Gh.	=19	10·2	Erroneous. [C.L.B.]
„ 18	41	„	„	Tn.	4−3, 8+I·5	9·I	
„ 19	42	„	„	„	4−4, 8+I	9·2	
„ 20	43	79	„	Ma.	8−I	9·4	
„ 20	43	34	„	Cr.	8+I	9·2	
„ 21	44	„	„	„	=8	9·3	
„ 21	44	60	„	Tn.	4−4, 8+0·5	9·2	
„ 22	45	T.94	„	Ni.	4−4, 8+0·5	9·2	Orange.
„ 23	46	79	„	Ma.	8−I·5	9·4	
„ 24	47	60	„	Tn.	4−4, 8+0·5	9·2	
„ 25	48	T.95	„	Bn.	12−I, 16+2	9·8	
„ 25	48	24	„	Bo.	=8	9·3	
„ 25	48	90	2	Hw.	16−3, 22+7	10·3	Doubtful. [C.L.B.]
„ 25	48	93	I	Cr.	8−I	9·4	
„ 26	49	160	„	Br.	=8	9·3	
„ 27	50	183	2	Ma.	8−2	9·5	
„ 27	0250	60	I	Tn.	=8	9·3	

(1855) R AURIGÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Apr. 28	0251	34	1	Cr.	8+1	9·2	
,, 28	51	T.95	,,	Bn.	12−2, 16+1	9·9	
May 2	55	70	,,	Bo.	=8	9·3	
,, 2	55	34	,,	Cr.	8−1, 9+1	9·4	
,, 8	61	24	2	Bo.	8−0·5, 9+1	9·3	
,, 10	63	60	,,	Tn.	=10	9·5	
,, 11	64	,,	1	,,	=19	10·2	
,, 15	68	,,	,,	Gh.	20−1, 23+1	10·6	
,, 16	69	T.120	,,	Bn.	20−1, =23	10·6	
,, 16	69	34	,,	Cr.	=16	10·0	
,, 17	70	T.94	,,	Ni.	20−1, 23+1	10·6	Yellowish orange.
,, 18	71	160	,,	Br.	14−2, 23+2	10·5	
,, 21	74	120	,,	Gh.	=23	10·7	
June 10	0294	160	2	Br.	=23	10·7	About.
,, 27	0311	120	,,	,,	26−4, 31+2	11·9	
,, 30	14	T.94	1	Ni.	=29	11·9	
July 16	30	,,	2	,,	29−1, 31+1	12·0	
,, 27	41	,,	,,	,,	=37	12·4	
Aug. 2	47	120	1	Br.	43+2	12·6	
,, 2	47	157	,,	Th.	43+2	12·6	
,, 11	56	,,	2	,,	43+2	12·6	
,, 11	56	T.94	1	Ni.	37−2, 43+2	12·6	
,, 14	59	157	3	Th.	=43	12·8	
,, 19	64	T.94	1	Ni.	37−1·5, 43+3	12·5	
,, 21	66	160	,,	Br.	43−2	13·0	About.
,, 24	69	157	,,	Th.	=43	12·8	
,, 29	74	T.150	,,	Bn.	43−2	13·0	
Sept. 3	79	T.94	,,	Ni.	37−2, 43+2	12·6	
,, 5	81	157	,,	Th.	43+1·5	12·7	
,, 19	95	160	,,	Br.	43−2, 44+2	13·0	
,, 20	0396	T.94	,,	Ni.	37−2, =43	12·7	
,, 24	0400	157	,,	Th.	=43	12·8	
,, 27	03	T.150	,,	Bn.	=43	12·8	
,, 30	06	120	,,	Br.	43−1	12·9	
,, 30	06	157	,,	Th.	34−1, 43+3	12·5	
Oct. 11	17	T.94	2	Ni.	29−1, 31+1	12·0	
,, 21	27	157	1	Th.	26−3	11·8	
,, 24	30	60	2	Tn.	26−8, 41+4	12·3	
,, 26	32	,,	,,	Th.	26−2, 27+2	11·7	
Nov. 10	47	160	1	Br.	26−2, 31+4	11·7	
,, 12	49	T.94	,,	Ni.	=20	10·5	
,, 12	49	90	3	Hw.	22+1, 26+5·5	10·9	
,, 14	51	157	1	Th.	23−4	11·1	
,, 14	51	150	2	Ad.	=23	10·7	
,, 16	53	,,	1	,,	=23	10·7	
,, 17	54	82	,,	,,	=23	10·7	
,, 17	54	T.50	,,	Bn.	20−1·5, 23+1	10·6	
,, 17	54	62	2	Th.	14−4	10·7	
,, 21	0458	T.94	1	Ni.	14−1, 20+1	10·4	

(1855) R AURIGÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Nov. 23	0460	157	2	Th.	23−1	10·8	
„ 23	60	160	1	Br.	=23	10·7	
„ 23	60	„	„	Tn.	23+1	10·6	
„ 26	63	157	„	Th.	23+3	10·4	
„ 27	64	90	3	Hw.	14−4, 22+4	10·7	
Dec. 3	70	T.94	1	Ni.	8−2, =14	9·9	
„ 5	72	150	2	Ad.	=14	10·3	
„ 5	72	40	„	Hw.	14−4, 22+4	10·7	
„ 6	73	157	1	Th.	8−2	9·5	
„ 7	74	„	„	„	8−1	9·4	
„ 7	74	160	„	Br.	14−2, 23+2	10·5	
„ 8	75	82	2	Ad.	=14	10·3	
„ 10	77	75	1	Ch.	=8	9·3	
„ 14	81	T.94	„	Ni.	=8	9·3	Yellowish orange.
„ 14	81	160	„	Br.	=14	10·3	
„ 15	82	60	„	Tn.	8+1	9·2	
„ 16	83	75	„	Ch.	=8	9·3	
„ 19	86	114	„	Th.	8−2	9·5	
„ 19	86	64	2	Ad.	8−2, 12+2	9·5	
„ 20	87	T.94	1	Ni.	=8	9·3	
„ 20	87	60	„	Tn.	4−4, 8+1	9·2	
„ 21	88	40	3	Hw.	=8	9·3	
„ 23	90	60	1	Tn.	4−2, 8+2	9·1	
„ 25	92	75	2	Ch.	8+3	9·0	
„ 26	93	60	1	Tn.	4−3, 8+1·5	9·1	
„ 29	96	„	2	„	4−1, 8+3	9·0	
„ 29	96	62	1	Th.	4−2, 8+2	9·1	
„ 31	0498	60	„	Tn.	4−2, 8+2	9·1	

(2100) U ORIONIS. (V. 4.)

H.D. 054920.

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Jan. 10	8682	t.150	1	Bn.	45−2	11·4	
„ 10	8682	160	„	Br.	49−2, 55+1	11·5	
„ 30	8702	T.120	„	Bn.	=45, 54+2	11·2	
Feb. 4	07	„	„	„	=45, 54+2	11·2	
„ 8	11	T.167	„	„	45−1	11·3	
„ 11	14	„	„	„	45+1	11·1	
„ 11	14	160	„	Br.	39−4, 49+2	11·0	
„ 15	18	T.120	„	Bn.	39−4, 45+1	11·0	
„ 21	24	160	„	Br.	39−2, 49+4	10·8	
„ 27	8730	183	2	Ma.	41−1	10·3	

(2100) U ORIONIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Mar. 1	8732	160	1	Br.	31−4, 39+3	10·3	
,, 3	34	183	,,	Ma.	41−0·5	10·2	
,, 4	35	,,	,,	,,	41−1	10·3	
,, 8	39	160	,,	Br.	31−2, 39+5	10·1	
,, 13	44	183	2	Ma.	41+2·5	9·9	
,, 15	46	45	1	Br.	11−4, 21+4	9·3	
,, 19	50	183	,,	Ma.	=29, 41+2·5	9·9	
,, 25	56	,,	2	,,	29+1, 41+4	9·8	
,, 27	58	,,	1	,,	29+1, 41+3	9·8	
,, 27	58	T.120	,,	Bn.	21−1, 29+1	9·8	
,, 31	62	45	,,	Br.	7−2, 11+2	8·7	
Apr. 1	63	79	,,	Ma.	15−6, 21+0.5	9·6	
,, 1	63	T.120	,,	Bn.	=21, 29+1	9·7	
,, 2	64	,,	,,	,,	20−1, 21+0·5	9·6	
,, 8	70	79	,,	Ma.	11−2, =14	9·1	
,, 10	72	,,	,,	,,	=11, 15+1	8·9	
,, 24	86	,,	,,	,,	4−5, 5+1	7·7	
,, 25	87	45	,,	Br.	4−1, 5+6	7·3	
,, 26	88	50	,,	Ma.	4−6, 5+1	7·8	
May 4	8796	45	,,	Br.	3−1, 4+5	6·7	
,, 8	8800	,,	,,	,,	2−5, 3+3	6·3	
,, 18	10	,,	2	,,	2+4	5·4	Difficult.
July 29	8882	B.	,,	Gi.	<3	< 6·6	Just glimpsed.
Sept. 8	8923	50	1	,,	=9	8·6	Difficult.
,, 19	34	45	2	Br.	11+3	8·6	
,, 29	44	50	1	Gi.	=11	8·9	
Oct. 31	76	,,	2	,,	=29	9·9	
Nov. 4	80	160	1	Br.	31−3, 39+4	10·2	
,, 8	84	50	2	Gi.	=29	9·9	
,, 11	87	160	1	Br.	31−4, 39+3	10·3	
,, 20	8996	,,	,,	,,	39−2	10·8	
,, 28	9004	60	2	Gh.	=45, =49	11·2	
,, 29	05	160	1	Br.	39−3, 49+4	10·9	
Dec. 6	12	120	2	Gh.	=45, =49	11·2	
,, 20	26	160	1	Br.	49−1, 55+2	11·4	
,, 30	36	,,	,,	,,	49−2, 55+1	11·5	
1911.							
Jan. 2	39	t.120	2	Bn.	45−2	11·4	
,, 9	46	160	1	Br.	49−1, 55+2	11·4	
,, 23	60	,,	,,	,,	49−2, 55+1	11·5	
,, 30	67	90	,,	Hw.	45−2, 77+5	11·4	
,, 30	67	60	2	Gh.	=45, =48, =49	11·2	
,, 31	68	T.120	1	Bn.	45−1	11·3	
Feb. 11	79	160	,,	Br.	=49	11·3	
,, 22	90	120	2	Gh.	=49	11·3	
,, 25	93	T.120	1	Bn.	39−5, 45+1	11·1	
,, 25	9093	160	,,	Br.	=49	11·3	

(2100) U ORIONIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
Mar. 2	9098	T.120	1	Bn.	39−4, 45+1	11·0	
„ 4	9100	160	„	Br.	39−2, 49+5	10·8	
„ 24	20	90	„	Hw.	29−6, =39, 41−3	10·5	
„ 31	27	T.120	„	Bn.	21−1, =29	9·8	
Apr. 3	30	„	„	„	21−1, 29+0·5	9·8	
„ 3	30	160	„	Br.	29−1	10·0	
„ 15	42	90	2	Hw.	11−5, 41+8	9·4	
„ 16	43	t.75	1	Bn.	14−1, 20+2	9·3	
„ 19	46	„	„	„	14−0·5, 15+1, 20+3	9·1	
„ 20	47	160	„	Br.	5−1	8·0	
May 5	62	45	„	„	4−1	7·3	
„ 9	66	„	2	„	3−2, 4+4	6·8	
„ 22	9179	„	3	„	3+3	6·3	Very difficult.
Aug. 6	9255	50	2	Gi.	=7	8·4	
„ 28	9277	„	1	„	=9, 11+2	8·6	
Sept. 20	9300	40	„	„	9−1·5, 11+1	8·8	
„ 21	01	160	„	Br.	=11	8·9	
Oct. 21	31	„	2	„	=29	9·9	
„ 28	38	60	„	Gh.	=29	9·9	
„ 30	40	„	„	„	=38	10·4	
„ 30	40	160	1	Br.	31−2, 39+5	10·1	
Nov. 1	42	40	2	Gi.	=21, =29	9·8	Difficult.
„ 12	53	120	„	Gh.	=39	10·6	
„ 14	55	40	„	Gi.	=41	10·2	
„ 20	61	160	1	Br.	=39	10·6	
„ 26	67	40	2	Gi.	=41	10·2	
Dec. 1	72	„	„	„	=39	10·6	
„ 9	80	160	1	Br.	39−3, 49+4	10·9	
„ 10	81	40	2	Gi.	39−1	10·7	
„ 15	86	T.120	1	Bn.	45−2, 54+1	11·4	
„ 17	88	160	„	Br.	=49	11·3	
„ 17	88	40	2	Gi.	=41	10·2	
„ 23	94	„	„	„	39−1	10·7	
„ 25	9396	„	„	„	39−1	10·7	
1912.							
Jan. 5	9407	160	„	Br.	49−1	11·4	
„ 8	10	40	„	Gi.	=62	11·6	
„ 21	23	160	1	Br.	49−1, 55+2	11·4	
„ 27	29	T.120	„	Bn.	39−4·5, 45+1	11·0	
Feb. 8	41	160	„	Br.	39−2, 49+5	10·8	
„ 23	56	„	„	„	31−4, 39+2	10·3	
Mar. 5	67	„	„	„	31−2	10·1	
„ 6	68	80	„	Dk.	29−2·5, 41+1	10·1	
„ 7	69	T.120	„	Bn.	21−1, =29	9·8	
„ 13	75	40	„	Gi.	15−3, 21+2	9·4	
„ 15	9477	„	„	„	15−2, 21+3	9·3	

(2100) U ORIONIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Mar. 19	9481	160	1	Br.	=31	9·9	
,, 19	81	80	,,	Dk.	=21	9·7	
,, 23	85	40	,,	Gi.	11−2, 15+2	8·9	
,, 28	90	160	,,	Br.	11−5, 21+5	9·3	
Apr. 4	9497	40	,,	Gi.	6−2, 7+2	8·4	
,, 8	9501	,,	,,	,,	6−2, 7+3	8·3	
,, 14	07	45	,,	Br.	4−3, 5+3	7·5	
,, 23	16	40	,,	Gi.	3−5, 4+3, g+2	6·9	
,, 25	18	45	,,	Br.	3−2, 4+3	6·8	
,, 26	19	40	,,	Gi.	3−5, 4+3	7·0	
May 3	26	,,	,,	,,	2−3·5, 3+2	6·3	
,, 7	30	,,	2	,,	2+2·5	5·6	
,, 17	9540	,,	,,	,,	1−4, 2+2	5·3	
Aug. 17	9632	,,	1	,,	k−1, 6+2	8·1	
,, 27	42	45	2	Bh.	5−3, 7+3	8·2	
,, 28	43	40	1	Gi.	6−2, 11+2	8·6	
,, 30	45	45	,,	Bh.	6−3, =7, =9, 12+3	8·5	
Sept. 2	48	,,	2	,,	5−4, =7, =8, 9+4	8·3	
,, 7	53	40	1	Gi.	6−2·5, 11+1	8·7	
,, 14	60	,,	,,	,,	11−1, 15+3	8·8	
,, 18	64	45	2	Bh.	9−3, =11, 14+3	8·9	
,, 20	66	,,	1	,,	=14	9·2	
,, 21	67	90	2	,,	11−2, =14, =15, 18+2	9·1	
,, 21	67	160	,,	Br.	11−3	9·2	
Oct. 4	80	90	,,	Bh.	18−1, =20, 21+1	9·5	
,, 7	83	45	,,	,,	18−2, =20, =22, 25+2	9·6	
,, 10	86	40	2	Gi.	15−3, 21+2	9·4	
,, 17	93	160	1	Br.	31−2, 39+4	10·1	
,, 22	9698	45	,,	Bh.	=29	9·9	
Nov. 1	9708	160	,,	Br.	31−4, 39+2	10·3	
,, 2	09	90	2	Bh.	29−4, =35, =41, 39+4	10·2	
,, 4	11	40	,,	Gi.	21−4, 41+3	10·0	
,, 10	17	90	2	Bh.	29−6, =39, 43+6	10·5	
,, 11	18	160	1	Br.	=39	10·6	
,, 19	26	90	2	Bh.	42−2, 44+2, =45	10·9	
,, 29	36	,,	1	,,	49−1, =51, 55+1	11·4	
Dec. 6	43	,,	,,	,,	=54, =55, =57	11·6	
,, 6	43	160	,,	Br.	=49	11·3	
,, 7	44	40	2	Gi.	=43	11·1	
,, 10	47	90	,,	Bh.	=57, =62	11·6	
,, 16	53	,,	,,	,,	=55, =57, =62	11·6	
,, 18	55	160	1	Br.	49−2, 55+2	11·4	
,, 23	60	150	2	Bh.	=57, =62	11·6	
,, 28	65	90	,,	,,	=57, =59	11·7	
,, 28	65	160	1	Br.	=55	11·6	
,, 30	9767	T.150	,,	Bn.	45−2, 54+1	11·4	

(2100) U ORIONIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Jan. 1	9769	T.167	1	Bn.	45−2, =54	11·4	
,, 2	70	90	2	Bh.	=83	12·2	
,, 5	73	150	,,	,,	=83	12·2	
,, 8	76	40	,,	Gi.	=83	12·2	
,, 12	80	T.120	1	Bn.	45−2, 54+1	11·4	
,, 15	83	160	,,	Br.	49−1, 55+2	11·4	
,, 25	93	360	2	Bh.	=83	12·2	
,, 26	94	T.120	1	Bn.	45−2, 54+1	11·4	
,, 31	9799	150	2	Bh.	45−4, =62, 77+4	11·6	
Feb. 3	9802	40	,,	Gi.	=62	11·6	
,, 3	02	160	1	Br.	=55	11·6	
,, 8	07	150	,,	Bh.	=39	10·6	
,, 10	09	,,	2	,,	39−5, 41−5, 57+5	11·0	
,, 16	15	90	,,	,,	=35, 39+1	10·3	
,, 20	19	160	1	Br.	39−2, 49+6	10·7	
,, 21	20	90	2	Bh.	=39, =40	10·6	
,, 27	26	,,	1	,,	31−4, 39+2, 45+8	10·3	
Mar. 3	30	,,	,,	,,	41−2, 39+2	10·4	
,, 3	30	40	2	Gi.	39−1, 43+2	10·8	
,, 7	34	90	1	Bh.	41−2, =38, 39+2	10·4	
,, 7	34	160	,,	Br.	39−2, 49+6	10·7	
,, 8	35	T.120	,,	Bn.	39−4, 45+1·5	11·0	
,, 8	35	79	,,	Ma.	=41	10·2	Ruddy.
,, 11	38	62	,,	Th.	39−3, 43+1	10·9	
,, 11	38	90	,,	Bh.	=38, =39	10·5	
,, 20	47	,,	2	,,	41−2, 39+2	10·4	
,, 20	47	79	,,	Ma.	41+2	10·0	Deep red.
,, 24	51	T.120	1	Bn.	39−4, 45+2	11·0	
,, 25	52	90	,,	Bh.	41−2, 39+2	10·4	
,, 25	52	160	,,	Br.	=39	10·6	
,, 30	57	90	,,	Bh.	29−2, 30−1, 41+1	10·0	
,, 30	57	183	2	Ma.	41−1	10·3	
Apr. 1	59	,,	1	,,	41+1	10·1	
,, 3	61	45	2	Bh.	=41	10·2	
,, 4	62	120	1	Th.	=39	10·6	
,, 5	63	90	,,	Bh.	35+1, 39+5, 41+1	10·1	
,, 7	65	,,	,,	,,	=29, =31	9·9	
,, 16	74	62	,,	Th.	=14	9·2	
,, 17	75	90	,,	Bh.	11−4, =14, 21+4	9·2	
,, 19	77	120	,,	Th.	11−1, 14+2	9·0	
,, 20	78	45	2	Bh.	=15, =18	9·2	
,, 22	80	79	,,	Ma.	5−6, 11+2	8·6	
,, 23	81	45	,,	Bh.	=8, 9+3	8·4	
,, 25	83	,,	1	,,	4−6, =5, 8+6	7·8	
,, 28	86	,,	,,	,,	4−4, 5+2	7·6	
,, 28	86	40	2	La.	11+5	8·4	
,, 30	88	,,	1	,,	k−2	8·1	
May 2	90	45	2	Bh.	4−3, 5+3	7·5	
,, 2	90	,,	,,	Br.	=4	7·2	About.
,, 4	92	,,	,,	Bh.	3−3, 4+3	6·9	
,, 5	9893	40	1	La.	h−3, =6	8·1	Doubtful.

[C.L.B.]

(2100) U ORIONIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
May 9	9897	45	1	Br.	3−2, 4+3	6·8	
,, 11	9899	,,	,,	Bh.	3−3, 4+3	6·9	
,, 15	9903	,,	2	,,	3−1, 4+5	6·7	
,, 17	05	,,	,,	,,	3+1	6·5	
Aug. 4	84	,,	1	,,	4−3, 5+4·5	7·5	
,, 18	9998	,,	,,	,,	5−3, =6, 7+2, 11+6	8·2	
,, 23	0003	,,	2	,,	=6, 7+1	8·3	
,, 27	07	90	1	,,	=7, 9+2, 11+4	8·4	
Sept. 2	13	,,	,,	,,	9+1, 11+2	8·6	
,, 6	17	,,	,,	,,	9−1, =11, 15+2	8·8	
,, 7	18	45	,,	Br.	7−3, 11+1	8·8	
,, 9	20	90	,,	Bh.	7−4, 9−1, 11+1, 14+4	8·8	
,, 20	31	,,	,,	,,	=15	9·0	
,, 27	38	,,	,,	,,	11−3, =14	9·2	
Oct. 4	45	45	2	,,	11−5, =14	9·3	
,, 9	50	155	1	Th.	21−1, 29+1	9·8	Red. Difficult.
,, 12	53	90	,,	Bh.	=21, =25	9·7	
,, 16	57	155	2	Th.	29−2, 39+5	10·1	
,, 19	60	90	1	Bh.	29−1, 41+2	10·0	
,, 22	63	150	,,	,,	=41	10·2	
,, 24	65	90	,,	,,	=41	10·2	
,, 24	65	160	,,	Br.	31−2, 39+4	10·1	
,, 30	71	90	,,	Bh.	41−2, 35−1, 39+2	10·3	
Nov. 3	75	155	,,	Th.	39−2·5	10·8	
,, 5	77	62	,,	,,	39−2	10·8	
,, 5	77	90	2	Bh.	42−1, 44+3	10·7	
,, 21	93	160	1	Br.	39−5, 49+3	11·0	
,, 21	93	90	,,	Bh.	41−5, 39−2, 55+8	10·7	
,, 22	94	120	2	Th.	=49, 55+2	11·3	
,, 24	0096	90	1	Bh.	41−5, 45+3	10·8	
,, 30	0102	40	3	La.	43−5	11·6	
Dec. 1	03	150	1	Bh.	41−7, =45, 62+7	11·0	
,, 9	11	90	,,	,,	45−2, =51, 55+2	11·4	
,, 9	11	155	,,	Th.	=55	11·6	
,, 9	11	40	2	La.	39−4, 43+2	10·9	
,, 12	14	120	,,	Th.	=45	11·2	
,, 16	18	155	,,	,,	45+1	11·1	
,, 16	18	150	1	Bh.	=55, =62	11·6	
,, 16	18	160	,,	Br.	49−1, 55+2	11·4	
,, 21	23	120	2	Th.	49−2, 55+1	11·5	
,, 22	24	,,	1	,,	=55	11·6	
,, 23	25	150	,,	Bh.	=55, =57	11·6	
,, 23	25	160	,,	Br.	=55	11·6	
,, 28	30	150	,,	Bh.	=55, =62	11·6	
,, 28	30	145	,,	Th.	55−3, 83+3	11·9	
,, 30	0132	T.120	,,	Bn.	45−2, =54	11·4	

(2100) U ORIONIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Jan. 2	0135	160	1	Br.	=55	11·6	
,, 5	38	157	,,	Th.	=57	11·6	
,, 6	39	,,	,,	,,	57+2	11·4	
,, 6	39	150	,,	Bh.	=55, =62	11·6	
,, 14	47	,,	,,	,,	55−1, =57	11·7	
,, 22	55	145	,,	Th.	=55	11·6	
,, 23	56	160	,,	Br.	55−1	11·7	
,, 26	59	T.150	,,	Bn.	45−2, =54	11·4	
,, 26	59	157	,,	Th.	49−3, 55−1, 83+4	11·7	
,, 26	59	150	,,	Bh.	=55, =57, =62	11·6	
Feb. 1	65	145	2	Th.	=49	11·3	
,, 2	66	T.120	1	Bn.	45−2, =54	11·4	
,, 2	66	150	,,	Bh.	=55, =62	11·6	
,, 4	68	157	2	Th.	55+2	11·4	
,, 8	72	,,	,,	,,	=45	11·2	
,, 10	74	,,	,,	,,	45+2	11·0	
,, 10	74	150	1	Bh.	39−8, 55+2	11·4	
,, 15	79	T.120	,,	Bn.	45−1	11·3	
,, 16	80	157	,,	Th.	39−3	10·9	
,, 18	82	90	,,	Bh.	=44	11·0	
,, 18	82	160	,,	Br.	49−1	11·4	
,, 22	86	90	,,	Bh.	21−10, 45+5	10·7	
,, 24	88	T.120	,,	Bn.	39−5, =45	11·1	
,, 24	88	90	3	Hw.	39−3, 45+3	10·9	
,, 26	90	,,	1	Bh.	41−2, 39+2	10·4	
,, 26	90	183	2	Ma.	41−3	10·5	
Mar. 1	93	160	1	Br.	39−5, 49+2	11·1	
,, 2	94	79	,,	Ma.	41−1	10·3	
,, 2	94	75	2	La.	=39, 41−5	10·6	
,, 7	0199	90	1	Bh.	41−2, 39+2	10·4	
,, 14	0206	75	2	La.	41−4	10·6	
,, 16	08	160	1	Br.	31−2, 39+4	10·1	
,, 16	08	T.120	,,	Bn.	39−3, 45+3	10·9	
,, 16	08	183	,,	Ma.	=41	10·2	
,, 18	10	,,	,,	,,	41−2	10·4	
,, 19	11	90	,,	Bh.	=41	10·2	
,, 21	13	T.120	,,	Bn.	35−3, =39	10·5	
,, 21	13	90	3	Hw.	=41	10·2	
,, 21	13	79	1	Ma.	41+0·5	10·1	
,, 21	13	90	,,	Bh.	29−2, 41+2	10·0	
,, 24	16	183	,,	Ma.	=41	10·2	
,, 27	19	,,	2	,,	41+1	10·1	
,, 27	19	160	1	Br.	31−3, 39+3	10·2	
,, 27	19	T.120	,,	Bn.	35−1, 39+2	10·3	
,, 29	21	45	,,	Bh.	21−1, 29+1	9·8	
,, 31	23	183	,,	Ma.	41+1	10·1	
Apr. 1	24	45	,,	Bh.	15−3, =20, 21+3	9·4	
,, 1	24	40	,,	La.	41+1	10·1	
,, 4	27	,,	,,	Bc.	21−1	9·8	
,, 5	28	45	,,	Bh.	11−1, =15, 14+1	9·0	
,, 6	29	40	,,	Bc.	18−1, 21+4	9·4	
,, 10	33	,,	2	La.	11−3, 15−3	9·2	
,, 10	0233	90	1	Bh.	=9, 11+2	8·6	

(2100) U ORIONIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Apr. 11	0234	79	1	Ma.	=11	8·9	
,, 14	37	,,	,,	,,	5−5, 9+1, 11+1·5	8·5	
,, 14	37	40	,,	La.	6−3, 11+3	8·6	
,, 15	38	160	,,	Br.	11+2	8·7	
,, 15	38	45	,,	Bh.	5−3, 7−1, 9+1, 11+6	8·4	
,, 16	39	40	,,	La.	6−3, 11+2	8·6	
,, 17	40	79	,,	Ma.	5−3, 11+6	8·2	
,, 18	41	,,	,,	,,	5−5, 11+5	8·4	
,, 18	41	45	,,	Bh.	=5	7·9	
,, 20	43	79	,,	Ma.	5+1	7·8	
,, 21	44	34	,,	Cr.	4−3, 5+3	7·5	
,, 21	44	40	,,	La.	k−2, =6, 11+6	8·2	
,, 22	45	45	,,	Bh.	4−2, 5+4	7·4	
,, 23	46	79	,,	Ma.	4−5, 5+1	7·7	Reddish.
,, 24	47	40	,,	La.	h−3, k+4, 6+4	7·8	
,, 25	48	79	,,	Ma.	4−4, 5+2	7·6	
,, 25	48	34	,,	Cr.	4−1	7·3	
,, 26	49	45	,,	Br.	4−1	7·3	
,, 26	49	,,	,,	Bh.	3−4·5, 4+1	7·1	
,, 27	50	79	,,	Ma.	4+2	7·0	
,, 27	50	20	2	La.	g−4, h+2	7·4	
,, 28	51	34	1	Cr.	=4	7·2	
May 1	54	20	2	La.	3−6, g−2, h+5	7·2	
,, 2	55	,,	1	,,	3−5, g−1	7·1	
,, 2	55	34	,,	Cr.	=3	6·6	
,, 2	55	45	,,	Bh.	3−3, 4+3	6·9	
,, 6	59	20	,,	La.	e−4, 3+2	6·4	
,, 9	62	45	,,	Bh.	2−4, 3+4	6·2	
,, 10	63	,,	,,	,,	2−3, 3+6	6·1	
,, 11	64	,,	,,	,,	2−2, 3+6	6·0	
,, 11	64	20	,,	La.	e−4, 3+1	6·5	
,, 14	67	45	,,	Bh.	2−1	5·9	
,, 16	69	,,	,,	,,	2+1·5	5·7	
,, 16	69	34	2	Cr.	2−2, 3+4	6·1	
,, 18	71	45	1	Bh.	=2	5·8	
,, 23	76	,,	2	,,	=2	5·8	
,, 25	0278	,,	,,	,,	=2	5·8	
July 19	0333	90	,,	,,	=3	6·6	Dull orange.
,, 30	44	45	1	,,	=3	6·6	
,, 31	45	40	,,	La.	h−2, k+2, 6+5	7·8	
Aug. 7	52	90	,,	Bh.	4−2, 5+6	7·3	
,, 14	59	,,	,,	,,	4−4, 5+2	7·6	
,, 23	68	45	,,	,,	4−3, 5+3	7·5	Red.
,, 27	72	90	,,	,,	4−6, 5+2, 8+6	7·8	
Sept. 1	77	,,	,,	,,	4−4, 5+2	7·6	Dull orange.
,, 2	78	T.50	,,	Bn.	4−5, 5+2	7·7	
,, 5	81	90	,,	Bh.	=5	7·9	
,, 15	91	40	,,	La.	6−4, 11+1	8·7	
,, 19	95	90	,,	Bh.	5−3, 7+3	8·2	
,, 20	0396	45	,,	Br.	5−4, 7+2	8·3	
,, 25	0401	90	,,	Bh.	5−5, 11+5	8·4	
,, 30	0406	160	,,	Br.	11+3	8·6	

(2100) U ORIONIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Oct. 7	0413	90	1	Bh.	5−7, 11+2	8·6	
„ 10	16	„	„	„	11+1	8·8	
„ 13	19	40	„	La.	11−2, 15−1, 21+4	9·1	
„ 18	24	90	„	Bh.	11−2·5, 21+5	9·1	
„ 26	32	157	2	Th.	21−1, 29+1	9·8	
„ 27	33	90	„	Bh.	11−4, 21+4	9·3	
Nov. 3	40	„	1	„	21−1, 29+1	9·8	
„ 7	44	„	„	„	21−2, 29+1, 31+2	9·8	
„ 7	44	157	2	Th.	29+2	9·7	
„ 10	47	60	1	Br.	21−1, 31+1	9·8	
„ 13	50	40	„	La.	21−2, 41+6	9·7	
„ 13	50	115	„	Th.	21+3	9·4	
„ 16	53	90	3	Hw.	21−1, 41+3	9·8	
„ 16	53	„	1	Bh.	41+2	10·0	
„ 17	54	157	2	Th.	29−5	10·4	
„ 17	54	T.120	1	Bn.	35−2, 39+1	10·4	
„ 22	59	90	„	Bh.	39+3, 41+1	10·2	
„ 23	60	157	„	Th.	39−1	10·7	
„ 26	63	40	„	La.	41−1, 39+2	10·3	
„ 26	63	90	„	Bh.	=39, 41−3	10·5	
„ 26	63	157	„	Th.	31−4, 39+2	10·3	
„ 27	64	160	„	Br.	=39	10·6	
„ 27	64	90	3	Hw.	=39	10·6	
Dec. 1	68	157	1	Th.	=35	10·2	
„ 6	73	„	„	„	39−4	11·0	
„ 7	74	„	„	„	39−2	10·8	
„ 7	74	90	„	Bh.	=39	10·6	
„ 8	75	„	3	Hw.	29−3, 39+3	10·2	
„ 10	77	„	1	Bh.	39−3·5, 55+7	10·9	
„ 14	81	150	„	„	39−5, 55+5	11·1	
„ 14	81	160	„	Br.	39−2·5, 49+5	10·8	
„ 15	82	40	2	La.	43−3, 62+2	11·4	
„ 19	86	157	„	Th.	=49	11·3	
„ 23	90	90	1	Bh.	=55, =57, =62	11·6	
„ 29	96	150	„	„	55−3, 83+3	11·9	
„ 29	0496	157	2	Th.	39−4	11·0	Red. Difficult.

(2186) X AURIGÆ. (V. 7.)

H.D. 060450.

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Nov. 6	8982	160	I	Br.	24—6, 26—2, 31+3	11·7	
„ 9	85	„	„	„	26—2, 29+2	11·6	
„ 20	8996	„	„	„	16—1, 20+4	10·2	
„ 29	9005	„	„	„	3—4, 6—1	9·0	
Dec. 20	26	60	„	„	2+2, 5+4	8·3	
1911.							
Jan. 1	38	45	„	„	2+3	8·2	
„ 6	43	„	„	F.G.B.	2—1, 5+1	8·6	
„ 9	46	„	„	Br.	2+2, 5+4	8·3	
„ 9	46	T.94	„	Ni.	2+2	8·3	Yellowish white. In t.22, 8·7.
„ 13	50	„	„	„	=2	8·5	Yellow.
„ 23	60	45	„	Br.	=2, 5+2	8·5	
„ 28	65	„	„	F.G.B.	6—1, 7+5	8·9	
„ 29	66	t.22	„	Ni.	6—1·5, 10+7	9·0	
Feb. 6	74	„	„	„	6—8, 10+1	9·6	
„ 11	79	160	„	Br.	=6	8·8	
„ 19	87	T.94	„	Ni.	10+1, 16+3	9·7	In t.22, 10·1.
„ 22	90	66	„	F.G.B.	16—1, 20+4·5	10·2	
„ 25	93	160	„	Br.	16—3, 20+2	10·4	
„ 25	93	T.94	„	Ni.	16—3, 24+7	10·4	
Mar. 1	9097	„	„	„	16—7, 24+3	10·8	
„ 4	9100	160	„	Br.	=24	11·1	
„ 5	01	T.94	„	Ni.	24—1, 26+1	11·3	
„ 7	03	66	2	F.G.B.	26—1, 29+2·5	11·5	
„ 17	13	T.94	„	Ni.	26—6, 36+4	12·0	
„ 24	20	„	I	„	36—2, 50+3	12·6	
Apr. 3	30	„	„	„	50—1, 54+1	13·1	
„ 3	30	160	2	Br.	=50	12·9	About.
„ 15	42	T.94	I	Ni.	36—3, 50+2	12·7	
„ 18	45	160	„	Br.	36—1, 46+1	12·5	
„ 19	46	T.94	„	Ni.	=36	12·4	
„ 19	46	198	„	F.G.B.	31—3·5, 38+2	12·3	
„ 26	53	T.94	„	Ni.	26—6·5, 36+4	12·0	
„ 30	57	160	2	Br.	24—1, 26+2	11·2	
May 5	62	T.94	I	Ni.	16—8, 24+1	11·0	
„ 6	63	66	2	F.G.B.	24—1, 26+1	11·3	
„ 10	67	„	I	„	16—1, 20+4·5	10·2	
„ 14	71	45	„	„	8—3, 16+3	9·8	
„ 21	78	160	„	Br.	5—6, 9+3	9·3	
„ 21	78	T.94	„	Ni.	6—1	8·9	In t.22, 9·0.
„ 24	81	45	„	F.G.B.	6—2, 7+4	9·0	
„ 28	85	„	„	Br.	5—3, 6—2	9·0	
„ 28	85	T.94	„	Ni.	=5, 6+0·5	8·7	
„ 31	9188	45	„	Bi.	=5	8·7	

(2186) X AURIGÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
June 3	9191	45	2	Bi.	=5	8·7	
,, 5	9193	T.94	,,	Ni.	=2	8·5	
,, 13	9201	,,	,,	,,	2+3	8·2	Yellow. In t.22, 8·5.
,, 17	05	,,	,,	,,	=1	8·4	About.
,, 19	07	45	1	Br.	2+4, 5+6	8·1	
July 2	20	T.94	,,	Ni.	=2, 5+1	8·6	In t.22, 8·7.
,, 5	23	,,	,,	,,	2−1, 5+1	8·6	
,, 10	28	,,	,,	,,	5−0·5, 6+1	8·7	
,, 21	39	60	,,	Br.	=7	9·4	
,, 21	39	45	,,	F.G.B.	=7	9·4	
,, 22	40	T.94	,,	Ni.	6−8, 10+1	9·6	
,, 30	48	,,	,,	,,	10−1, 16+3	9·8	
Aug. 3	52	,,	,,	,,	=16	10·1	
,, 3	52	160	,,	Br.	16−1, 20+4	10·2	
,, 10	59	T.94	,,	Ni.	16−7, 24+3	10·8	
,, 15	64	66	,,	F.G.B.	=24	11·1	
,, 17	66	T.94	,,	Ni.	24−1, 26+1	11·3	
,, 23	72	,,	,,	,,	26−5, 36+5	11·9	
,, 24	73	198	,,	F.G.B.	=26	11·4	
,, 30	79	T.94	,,	Ni.	27−7·5, 36+2	12·2	
Sept. 1	81	160	,,	Br.	26−6, 36+4	12·0	
,, 17	9297	,,	2	,,	=36	12·4	About.
,, 22	9302	T.94	1	Ni.	36−1, 50+4	12·5	
,, 26	06	198	,,	F.G.B.	=38	12·5	
,, 28	08	T.94	,,	Ni.	=36	12·4	
Oct. 9	19	,,	,,	,,	24−1, 26+2·5	11·2	
,, 18	28	,,	,,	,,	10−1, 16+2·5	9·8	
,, 21	31	45	,,	Br.	9−1, 16+4	9·7	
,, 21	31	,,	,,	F.G.B.	=7	9·4	
,, 26	36	T.94	,,	Ni.	6−2, 10+6	9·1	In t.22, 9·4.
,, 30	40	60	,,	Br.	5−4, 9+4	9·2	
,, 31	41	45	,,	F.G.B.	6−4, 7+2	9·2	
Nov. 1	42	T.94	,,	Ni.	=6	8·8	In t.22, 9·1.
,, 6	47	45	,,	F.G.B.	2−1·5, 5+1	8·6	
,, 8	49	t.22	,,	Ni.	2−1·5, 5+1	8·6	
,, 18	59	45	,,	F.G.B.	=1	8·4	
,, 20	61	60	,,	Br.	2+2	8·3	
,, 20	61	t.22	,,	Ni.	=1	8·4	
,, 22	63	57	2	Bh.	=5	8·7	
,, 25	66	t.22	1	Ni.	1−0·5, 2+1	8·4	
,, 29	70	57	2	Bh.	5−6, 13+6	9·3	Doubtful.
Dec. 8	79	t.22	1	Ni.	=1, 2+1	8·4	
,, 9	80	45	,,	Br.	2+4, 5+5	8·2	
,, 9	80	,,	,,	F.G.B.	1+1	8·3	
,, 15	86	,,	,,	,,	=5	8·7	
,, 15	86	t.22	,,	Ni.	=2	8·5	
,, 17	88	60	,,	Br.	=2, =3, 5+2	8·5	
,, 24	95	t.22	,,	Ni.	5−1, 6+0·5	8·8	
,, 25	9396	45	,,	F.G.B.	6−1, 7+5	8·9	
,, 30	9401	T.94	,,	Ni.	=10	9·7	In t.22, 9·4.

(2186) X AURIGÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Jan. 5	9407	160	I	Br.	9−4, 16+1	10·0	
„ 5	07	45	„	F.G.B.	9−4, 16+1	10·0	
„ 7	09	T.94	„	Ni.	10−2, 16+1·5	9·9	
„ 11	13	57	„	Bh.	22−1, =23, =24, 25+1	11·1	
„ 13	15	„	2	„	24−4, =26, 30+4	11·5	
„ 14	16	T.94	I	Ni.	24−2·5, 26+1	11·3	
„ 22	24	75	2	Bh.	26−2, 30+2	11·7	
„ 23	25	150	„	„	26−6, =36, =37, 45+6	12·2	
„ 25	27	T.94	„	Ni.	26−7·5, 36+2	12·2	
„ 26	28	160	„	Br.	26−7, 38+4	12·1	
„ 26	28	150	I	Bh.	24−7, =29, 39+7	11·8	
„ 27	29	105	„	F.G.B.	31−1, 38+4	12·1	
Feb. 3	36	90	2	Bh.	=36, =37	12·4	
„ 4	37	160	I	Br.	36−1, 45+1	12·5	
„ 7	40	T.94	„	Ni.	36−3, 50+2	12·7	
„ 8	41	132	„	F.G.B.	46−1, 54+5	12·7	
„ 10	43	90	„	Bh.	=38, =44, =45	12·6	
„ 10	43	T.94	„	Ni.	36−2, 50+2	12·7	
„ 14	47	150	2	Bh.	=45, =48, =56	12·7	
„ 21	54	T.94	„	Ni.	36−3·5, 50+2	12·7	
„ 23	56	150	„	Bh.	=45, =46	12·6	
„ 29	62	„	„	„	<47	<12·6	Not seen.
Mar. 3	65	375	„	„	=52	13·0	
„ 3	65	T.94	„	Ni.	=50	12·9	
„ 5	67	160	„	Br.	45−1, 50+1	12·8	
„ 6	68	90	I	Bh.	=50	12·9	
„ 7	69	132	„	F.G.B.	=46	12·6	
„ 7	69	T.94	„	Ni.	36−3, 50+1	12·8	
„ 9	71	150	„	Bh.	=50	12·9	
„ 15	77	90	„	„	=36, =37	12·4	
„ 17	79	T.94	„	Ni.	26−7, 36+3	12·1	
„ 19	81	„	„	„	26−6, 36+4	12·0	
„ 19	81	90	„	Bh.	31−3, =36, =37, 43+3	12·4	
„ 22	84	„	„	„	=29, =30	11·9	
„ 22	84	160	„	Br.	26−3, =29	11·8	
„ 28	90	90	2	Bh.	24−3, =26, 29+3	11·4	
„ 29	91	160	I	Br.	=24	11·1	
„ 29	91	T.94	„	Ni.	24−1, 26+1	11·3	
„ 31	93	150	2	Bh.	20−4, =24, 26+4	11·0	
Apr. 2	95	45	I	„	19−4, 20−2, 24+2, 26+4	10·9	
„ 6	9499	„	„	„	16−5, =19, =20, 24+5	10·6	
„ 9	9502	T.94	„	Ni.	16−6, 24+5	10·7	
„ 10	03	45	2	Bh.	=18, =19	10·5	
„ 13	06	„	I	„	=15	10·0	
„ 13	06	160	„	Br.	9−2, 16+3	9·8	
„ 14	07	45	„	Bh.	=13, =14, =15	10·0	
„ 16	09	„	„	F.G.B.	=16	10·1	
„ 19	9512	„	„	„	6−3, 7+3	9·1	

(2186) X AURIGÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Apr. 19	9512	45	2	Bh.	5−7, =8, 16+7	9·4	
,, 19	12	T.94	1	Ni.	6−5, 10+3	9·4	
,, 21	14	45	,,	F.G.B.	6−1, 7+5	8·9	
,, 22	15	,,	,,	Bh.	=5, =6	8·8	
,, 23	16	T.94	,,	Ni.	6−1	8·9	
,, 24	17	45	,,	F.G.B.	=6	8·8	
,, 25	18	,,	,,	Br.	2−1, 5+1	8·6	
,, 26	19	,,	,,	Bh.	=3, =4	8·6	
,, 29	22	,,	,,	,,	=4	8·6	
,, 29	22	,,	,,	F.G.B.	=5	8·7	
,, 29	22	T.94	,,	Ni.	=5	8·7	In t.22, 8·8.
May 1	24	45	2	Bh.	=3, =4	8·6	
,, 5	28	,,	,,	,,	=2	8·5	
,, 6	29	t.22	1	Ni.	2−1, 5+1	8·6	
,, 8	31	45	2	Bh.	=2	8·5	
,, 12	35	,,	,,	,,	=2	8·5	
,, 13	36	t.22	1	Ni.	=1, 2+1	8·4	
,, 16	39	45	,,	F.G.B.	=2	8·5	
,, 17	40	,,	2	Bh.	=2	8·5	
,, 20	43	,,	1	F.G.B.	=2	8·5	
,, 23	46	t.22	,,	Ni.	2+0·5, 5+2	8·5	
,, 27	50	T.94	2	,,	2+0·5	8·5	Yellow. In t.22, 8·6.
June 16	70	,,	,,	,,	=10	9·7	Difficult.
July 9	93	,,	,,	,,	26−2	11·6	Glimpsed.
,, 12	9596	,,	,,	,,	26−2	11·6	Uncertain.
,, 23	9607	,,	,,	,,	<36	<12·4	Not seen.
,, 30	14	90	,,	Bh.	<31	<12·0	,, ,,
Aug. 5	20	T.94	1	Ni.	<36	<12·4	,, ,,
,, 11	26	90	2	Bh.	=39	12·5	
,, 16	31	T.94	,,	Ni.	50−2·5, 54+1	13·1	Difficult.
,, 18	33	,,	1	,,	50+0·5	12·9	
,, 19	34	,,	,,	,,	50−2, 54+1	13·1	
,, 19	34	150	2	Bh.	=44, =46	12·6	
,, 27	42	T.94	,,	Ni.	=36	12·4	Glimpsed.
,, 30	45	90	1	Bh.	=33, =34, =36	12·3	
Sept. 2	48	,,	,,	,,	29−1, =30, =31, 32+1	12·0	
,, 2	48	160	2	Br.	26−5	11·9	
,, 4	50	T.94	1	Ni.	26−5, 36+5	11·9	
,, 6	52	90	2	Bh.	24−3, =26, 29+3	11·4	
,, 8	54	T.94	1	Ni.	24−3, 26+0·5	11·4	
,, 12	58	,,	,,	,,	16−7, 24+2	10·9	
,, 15	61	,,	,,	,,	16−6, 24+3·5	10·7	
,, 17	63	160	,,	Br.	20−1, 24+4	10·7	
,, 18	64	45	,,	Bh.	16−1, 18+1	10·3	
,, 21	67	,,	,,	,,	13−1, =14, =15, 16+1	10·0	
,, 22	68	T.94	,,	Ni.	10−1, 16+3	9·8	
,, 27	9673	45	2	Bh.	9−2, =13, =14, 15+2	9·9	

(2186) X AURIGÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Oct. 2	9678	T.94	I	Ni.	6−5·5, 10+3	9·4	
„ 4	80	45	„	Bh.	5−4, 6−3, 7+3, 9+4	9·1	
„ 7	83	„	„	„	5−4, =6, 9+4	9·0	
„ 8	84	t.22	„	Ni.	6−6, 10+2·5	9·4	
„ 10	86	45	„	Br.	5−5, 9+4	9·2	
„ 11	87	„	2	Bh.	=3, =5	8·7	
„ 17	93	„	„	„	=2, =6	8·7	
„ 17	93	t.22	I	Ni.	=6	8·8	
„ 19	95	45	2	Bh.	1−1, =2, 3+1	8·5	
„ 22	9698	„	I	„	2−1, =3, 5+1	8·6	
„ 25	9701	„	2	„	=2, =3	8·6	
„ 29	05	„	I	Br.	2+1	8·4	
„ 30	06	„	„	Bh.	2−1, =3, 5+1	8·6	
Nov. 2	09	„	„	„	2−1, =3, =5, 6+1	8·7	
„ 3	10	t.22	„	Ni.	2−3, 5−2, 6+3	8·7	
„ 7	14	45	2	Bh.	=3, =5	8·7	
„ 11	18	„	I	„	=5, =6	8·8	
„ 11	18	„	„	Br.	=5	8·7	
„ 17	24	„	2	Bh.	5−6, 6−5, 12+5, 13+6	9·3	
„ 19	26	T.94	I	Ni.	6−0·5	8·9	In t.22., 9·3.
„ 29	36	45	„	Bh.	16−3, =18, =19, 20+1·5	9·4	
Dec. 2	39	T.94	„	Ni.	16+1	10·0	In t.22, 10·2.
„ 6	43	160	„	Br.	16−3, 19+1	10·4	
„ 6	43	90	„	Bh.	16−7, =20, 28+7	10·8	
„ 9	46	T.94	„	Ni.	16−8, 24+2	10·9	
„ 10	47	45	2	Bh.	24−1, =25, 26+1	11·2	
„ 16	53	90	„	„	24−1, =25, 26+1	11·2	
„ 16	53	T.94	I	Ni.	26−2, 36+8	11·6	
„ 21	58	„	2	„	26−5·5, 36+4	12·0	
„ 25	62	150	„	Bh.	26−3, =29, 31+3	11·7	
„ 28	65	90	„	„	29−2, =30, =31, 33+2	12·0	
„ 28	65	160	I	Br.	36−1, 38+1	12·5	
„ 29	66	T.94	„	Ni.	=36	12·4	
„ 31	68	90	2	Bh.	=37, =38, =39	12·5	
1913.							
Jan. 2	70	150	„	„	=38, =41, =43	12·5	
„ 5	73	„	I	„	=50	12·9	
„ 6	74	160	„	Br.	36−3, 50+2	12·7	
„ 6	74	T.94	2	Ni.	=50	12·9	
„ 12	80	90	„	Bh.	48+1	12·6	
„ 15	83	T.94	I	Ni.	50−1, 54+1	13·1	
„ 25	93	120	„	Br.	50−1, 54+2	13·0	
„ 25	93	150	„	Bh.	=48, =50	12·8	
„ 27	95	T.94	„	Ni.	36−5, 50+1, 54+4	12·8	
„ 31	9799	90	„	Bh.	=43, =45, =46	12·6	
Feb. 3	9802	45	2	„	31−3, =33, 43+3	12·3	
„ 8	07	90	I	„	=31, =32, =33	12·1	
„ 8	07	160	„	Br.	26−4, 36+6	11·8	
„ 8	9807	T.94	„	Ni.	26−8, 36+1	12·3	

(2186) X AURIGÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Feb. 14	9813	T.94	1	Ni.	26−1·5, 36+8	11·6	
„ 16	15	90	„	Bh.	20−6, 24−4, 30+4, 29+6	11·4	
„ 21	20	„	„	„	20−4, =24, 26+4	11·0	
„ 22	21	T.94	„	Ni.	16−5, 24+5	10·6	
„ 24	23	160	„	Br.	16−4, 20+1	10·5	
„ 27	26	45	„	Bh.	=15, =16	10·1	
Mar. 2	29	T.94	„	Ni.	16−2, 24+8	10·3	
„ 3	30	45	„	Bh.	6−6, 7−2, 11+2, 16+6	9·5	
„ 7	34	„	„	„	5−5, =9, 11+5	9·4	
„ 7	34	„	„	Br.	6−2, 9+6	9·0	
„ 8	35	T.94	„	Ni.	6−2·5, 10+6	9·1	In t.22, 9·4.
„ 11	38	45	„	Bh.	6−6, =7, 11+3	9·4	
„ 15	42	„	2	„	=5	8·7	
„ 15	42	T.94	1	Ni.	2−3, 5+1, 6+2	8·7	
„ 20	47	45	„	Bh.	2−1, =3, 5+1	8·6	
„ 23	50	t.22	„	Ni.	2−3, 5−3, 6+3	8·8	
„ 25	52	45	2	Bh.	=1, =2, =3	8·5	
„ 28	55	„	1	„	=1, =2	8·5	
„ 28	55	60	„	Br.	2+1	8·4	
„ 30	57	45	„	Bh.	1+1, 2+2, 6+5	8·3	
Apr. 1	59	„	„	„	=2, =3	8·6	
„ 1	59	t.22	„	Ni.	1−2, =2, 5+1	8·6	
„ 3	61	45	2	Bh.	=1, =2	8·5	
„ 7	65	„	1	„	1+2, 5+5	8·2	
„ 9	67	t.22	„	Ni.	2−1, 5+1	8·6	
„ 11	69	45	2	Bh.	=1, 2+1	8·4	
„ 14	72	t.22	1	Ni.	=1, =2, 5+1·5	8·5	In T.94, 8·2
„ 16	74	45	2	Bh.	=1, =2	8·5	
„ 20	78	„	„	„	=1, 3+2	8·4	
„ 20	78	t.22	„	Ni.	=2	8·5	In T.94, 8·2
„ 25	83	45	1	Bh.	2−1, =3, =5, 6+1	8·7	
„ 27	85	t.22	„	Ni.	2−1, 5+1	8·6	
„ 28	86	45	„	Br.	2+1	8·4	
May 1	89	T.50	„	Bn.	3−0·5, =5	8·7	
„ 2	90	45	„	Bh.	4−3, =6, 7+6	8·8	
„ 6	94	T.50	„	Bn.	5−4·5, 7+2	9·2	
„ 7	95	t.22	„	Ni.	6−4, 10+4	9·3	
„ 9	97	160	„	Br.	6−5, 9+3	9·3	
„ 10	98	T.50	„	Bn.	5−5, 7+2	9·2	
„ 11	9899	45	„	Bh.	5−4, 6−1, 7+4, 9+4	9·1	
„ 14	9902	T.94	„	Ni.	=10, 16+2	9·8	
„ 17	05	45	2	Bh.	=8, =10	9·6	
„ 18	06	T.95	„	Bn.	16−1, 19+3	10·2	
„ 23	11	T.120	1	„	20−1·5, 24+4	10·7	
„ 25	13	T.95	„	„	=19, =20	10·6	
„ 25	13	90	2	Bh.	=9, =10, =13	9·7	
„ 25	13	T.94	1	Ni.	=24	11·1	
„ 27	15	160	„	Br.	20−3, 24+2	10·9	
„ 30	9918	T.120	„	Bn.	24−2, 26+1	11·3	

(2186) X AURIGÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
June 2	9921	90	2	Bh.	16−3, =20, 24+6	10·5	
,, 16	35	T.94	,,	Ni.	..	<12·2	Not seen.
July 8	57	150	,,	Bh.	=50, =52, 54+3	12·9	
,, 11	60	90	,,	,,	=36, =38, =39	12·5	
,, 22	71	,,	1	,,	29−3, =33, 41+3	12·2	
,, 26	75	,,	2	,,	26−3, =31, 32+3	11·8	
,, 30	79	,,	1	,,	20−6, =26, 29+6	11·3	
Aug. 1	81	,,	,,	,,	24−2, 26+1	11·3	
,, 4	84	,,	,,	,,	20−6, 24−1, 29+6	11·2	
,, 4	84	160	,,	Br.	24−2, 26+1	11·3	
,, 9	89	90	,,	Bh.	19−4, 20−2, 24+2, 26+4	10·9	
,, 14	94	T.94	,,	Ni.	16−6·5, 24+4	10·7	
,, 16	96	90	2	Bh.	19−3, 18−2, 24+3	10·7	
,, 18	9998	,,	1	,,	19+1, 20+1	10·5	
,, 21	0001	T.94	2	Ni.	=16	10·1	
,, 24	04	,,	1	,,	16+1	10·0	
,, 24	04	90	,,	Bh.	5−10, 9−1, 16+5	9·7	
,, 25	05	160	2	Br.	9−1, 16+4	9·7	
,, 27	07	90	1	Bh.	6−4, 9+3	9·3	
Sept. 2	13	,,	,,	,,	9+5	9·1	
,, 4	15	T.94	,,	Ni.	6−6, 10+3	9·4	In t.22, 9·6.
,, 5	16	90	,,	Bh.	5−3, 6−2, 9+6	9·0	
,, 7	18	45	,,	Br.	=6	8·8	
,, 7	18	T.50	,,	Bn.	5−5, 6−2, 7+2	9·1	
,, 9	20	,,	,,	,,	5−2, 6+1, 7+5	8·8	
,, 9	20	90	,,	Bh.	6−2, 9+5	9·1	
,, 9	20	t.22	,,	Ni.	6−4, 10+5	9·2	
,, 15	26	,,	,,	,,	=5, =6	8·8	
,, 20	31	90	2	Bh.	=2, =3	8·6	
,, 24	35	45	1	,,	2−1, =3, 5+1	8·6	
,, 24	35	,,	,,	Br.	2−1, 5+1	8·6	
,, 26	37	t.22	,,	Ni.	5−0·5, 6+1	8·7	
,, 27	38	45	,,	Bh.	3−1, =5, 6+1	8·7	
Oct. 4	45	,,	,,	,,	5−2, =6	8·9	
,, 9	50	t.22	,,	Ni.	=5, =6	8·8	
,, 12	53	90	,,	Bh.	=6	8·8	
,, 19	60	,,	,,	,,	6−2, 9+1	9·3	
,, 19	60	T.94	,,	Ni.	=6	8·8	
,, 23	64	45	,,	Br.	=7	9·4	
,, 25	66	T.94	,,	Ni.	6−6, 10+3	9·4	
,, 29	70	90	2	Bh.	16−2, 19+2	10·3	
Nov. 3	75	160	1	Br.	16−6, 24+4	10·7	
,, 5	77	90	,,	Bh.	16−5, =20, 24+5	10·6	
,, 5	77	T.94	2	Ni.	16−7, 24+2	10·9	
,, 11	83	,,	1	,,	16−8, 24+1·5	10·9	
,, 12	84	90	2	Bh.	=24, =26	11·3	
,, 17	89	,,	1	,,	24−3, 26−1	11·5	
,, 21	93	,,	,,	,,	26−6·5, 36+3	12·1	
,, 22	94	160	,,	Br.	36−1, 46+1	12·5	
,, 22	0094	T.120	,,	Bn.	36+1	12·3	

(2186) X AURIGÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Nov. 22	0094	T.94	1	Ni.	26−8, 36+1·5	12·2	
„ 28	0100	150	„	Bh.	31−1·5, =36, 38+3	12·2	
Dec. 1	03	T.94	„	Ni.	50−2, 54+1·5	13·1	
„ 1	03	90	2	Bh.	=36, =38	12·5	
„ 4	06	„	„	„	=36, =39	12·5	
„ 7	09	T.94	„	Ni.	50−2, 54+1	13·1	
„ 9	11	150	„	Bh.	=50	12·9	M.
„ 16	18	„	„	„	=50	12·9	Red. M.
„ 16	18	120	„	Br.	54−2	13·4	About.
„ 18	20	T.94	„	Ni.	50−3, 54+0·5	13·2	
„ 21	23	150	„	Bh.	=50	12·9	Red. M.
„ 23	25	„	1	„	50−1, =52, 54+1	13·0	„ „
„ 23	25	160	„	Br.	50−1, 54+1	13·1	
„ 24	26	T.94	2	Ni.	50−2, 54+1	13·1	
„ 27	29	150	„	Bh.	46−2, =50, 52+2	12·8	
„ 29	31	„	1	„	45−2, 50+2	12·8	
„ 29	31	T.94	2	Ni.	50−0·5, 54+2	13·0	
1914.							
Jan. 2	35	120	1	Br.	36−1, 45+1	12·5	
„ 3	36	T.120	„	Bn.	29−3, 33+1	12·1	
„ 4	37	T.94	„	Ni.	36−1, 50+4	12·5	
„ 6	39	90	„	Bh.	=34, 36+1, 38+1	12·3	
„ 11	44	„	2	„	=31, =32, =33	12·1	
„ 11	44	T.94	1	Ni.	26−4, 36+6	11·8	
„ 14	47	90	„	Bh.	26−2, 31+4	11·6	
„ 17	50	T.94	„	Ni.	=26	11·4	
„ 18	51	90	2	Bh.	24−2, =26, 29+4	11·4	
„ 23	56	„	1	„	19−3, 20−2, 24+2, 26+6	10·8	
„ 23	56	45	„	Br.	20−2, 24+3	10·8	
„ 26	59	90	„	Bh.	16−3, 24+6·5	10·4	
„ 30	63	T.94	2	Ni.	16+1	10·0	
Feb. 2	66	T.70	1	Bn.	16+1	10·0	
„ 2	66	45	2	Bh.	6−3, =7, 11+6	9·2	
„ 5	69	T.94	1	Ni.	6−6·5, 10+2, 16+2	9·6	
„ 8	72	90	„	Bh.	5−6, 6−4, 8+2, 9+3	9·3	
„ 12	76	T.94	„	Ni.	6−7, 10+3, 16+4	9·5	
„ 15	79	T.50	„	Bn.	5−5, 6−1, 7+1	9·1	
„ 15	79	90	„	Bh.	5−3, 6−2, 8+4, 9+6	9·0	
„ 18	82	45	„	Br.	6−1	8·9	
„ 21	85	90	„	Bh.	=6	8·8	
„ 22	86	T.50	„	Bn.	5−5, 6+2, 7+1	9·0	
„ 26	90	90	„	Bh.	2−2, =5, 6+1	8·7	
Mar. 1	93	45	„	Br.	=2	8·5	
„ 1	93	t.22	„	Ni.	2−1, =5	8·7	
„ 2	94	45	2	Bh.	1−1, =2, 3+1	8·5	
„ 7	0199	„	1	„	=1, 2+2	8·4	
„ 10	0202	t.22	„	Ni.	2−1, =5, 6+2	8·6	
„ 11	0203	40	„	Bc.	=2, 6+4	8·5	

(2186) X AURIGÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Mar. 11	0203	45	1	Bh.	1−1, 2+1, 5+4	8·4	
,, 16	08	,,	,,	,,	2−1, 3+1	8·6	
,, 16	08	,,	,,	Br.	2+1	8·4	
,, 19	11	90	2	Bh.	=2, =3	8·6	
,, 21	13	45	1	,,	2−1, =3, 5+1	8·6	
,, 21	13	T.50	,,	Bn.	2−1, =3	8·6	
,, 22	14	t.22	,,	Ni.	2−2, 5−2, 6+1	8·8	Yellowish white.
,, 24	16	79	,,	Ma.	5−4, 9+4	9·2	
,, 25	17	90	,,	Bh.	=5, 6+1	8·7	
,, 26	18	40	,,	Bc.	6+4	8·4	
,, 27	19	45	,,	Br.	5−1, 6+1	8·8	
,, 27	19	T.50	,,	Bn.	=5	8·7	
,, 28	20	t.22	,,	Ni.	2−2, 5−2, 6+1	8·8	Yellowish white.
,, 29	21	45	,,	Bh.	5−2, =6, 9+7	8·9	
,, 31	23	79	,,	Ma.	5−4, 9+4	9·2	
Apr. 1	24	45	,,	Bh.	5−6, 6−4, 7+2, 9+3	9·3	
,, 4	27	T.94	,,	Ni.	6−5, 16+8	9·3	
,, 5	28	45	,,	Bh.	6−6, =8, 16+6	9·5	
,, 10	33	90	,,	,,	6−6, =9, 16+6	9·5	
,, 11	34	79	,,	Ma.	16−1, 20+4	10·2	
,, 12	35	T.94	,,	Ni.	16−1·5, 24+8	10·3	
,, 13	36	90	,,	Bh.	16−4, =19, 20+2	10·5	
,, 15	38	160	,,	Br.	20−1, 24+4	10·7	
,, 15	38	79	,,	Ma.	20−1	10·7	
,, 18	41	,,	,,	,,	20−1·5, 24+3	10·8	
,, 18	41	45	,,	Bh.	19−3, 24+3	10·8	
,, 18	41	T.94	,,	Ni.	16−9, 24+1	11·0	
,, 20	43	79	,,	Ma.	24+1	11·0	
,, 22	45	90	2	Bh.	19−6, =24, 26+3	11·1	
,, 23	46	79	1	Ma.	24−0·5, 26+2	11·2	
,, 25	48	,,	,,	,,	26+2	11·2	
,, 25	48	T.120	,,	Bn.	24−2, 26+1	11·3	
,, 26	49	160	,,	Br.	24−2, 26+1	11·3	
,, 26	49	T.94	,,	Ni.	24−3, 26−0·5	11·4	
,, 27	50	79	,,	Ma.	=26	11·4	
,, 28	51	T.120	,,	Bn.	26−3, 29+1	11·7	
,, 30	53	90	,,	Bh.	26−2, 31+4	11·6	
May 2	55	,,	,,	,,	26−4, 31+2	11·8	
,, 14	67	,,	,,	,,	33−4, =36	12·5	
,, 16	69	T.150	,,	Bn.	=45	12·6	Difficult.
,, 17	70	T.94	,,	Ni.	36−2, 50+2	12·7	
,, 18	71	160	2	Br.	46−2, 50+1	12·8	
,, 21	74	T.150	1	Bn.	45−2, 52+1	12·9	
,, 21	74	150	2	Bh.	36−2	12·6	
,, 21	74	T.94	,,	Ni.	36−2, 50+2	12·7	
,, 29	82	90	3	Bh.	29−4, =36	12·3	
June 6	90	,,	,,	,,	26=3, 31+3	11·7	
,, 13	0297	,,	2	,,	16−6, 26+6	10·8	
,, 30	0314	,,	,,	,,	9−5, 16+1	10·1	
,, 30	0314	T.94	,,	Ni.	10−3, 16+1·5	10·0	

(2186) X AURIGÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
July 7	0321	T.94	1	Ni.	6−4, 10+5·5	9·2	
,, 10	24	150	2	Bh.	6−2·5, 16+10	9·1	
,, 14	28	90	,,	,,	=6	8·8	
,, 16	30	t.22	1	Ni.	5−1, =6	8·8	
,, 19	33	40	,,	La.	2−3, e+3	8·8	
,, 19	33	90	2	Bh.	6+2	8·6	
,, 27	41	t.22	1	Ni.	2−1, 5+1	8·6	
,, 28	42	90	,,	Bh.	=5	8·7	
,, 31	45	40	,,	La.	b−3, =2	8·5	
Aug. 3	48	160	,,	Br.	2+5	8·0	
,, 3	48	90	,,	Bh.	=1	8·4	
,, 11	56	45	,,	,,	1+2	8·2	
,, 11	56	t.22	,,	Ni.	1+0·5	8·4	Yellowish white.
,, 13	58	90	,,	Bh.	1+3	8·1	
,, 15	60	45	,,	,,	1+1, 2+2	8·3	
,, 17	62	t.22	,,	Ni.	=1, 2+1	8·4	Yellow.
,, 21	66	45	,,	Bh.	=1	8·4	
,, 24	69	40	,,	La.	=2, 6+3	8·5	
,, 26	71	90	2	Bh.	2−1, 5+1	8·6	
,, 30	75	t.22	1	Ni.	5−1, =6	8·8	
Sept. 1	77	,,	,,	,,	5−1, =6	8·8	
,, 1	77	90	,,	Bh.	=5	8·7	
,, 2	78	T.50	,,	Bn.	3−0·5, =5	8·7	
,, 6	82	90	,,	Bh.	6−1	8·9	
,, 9	85	T.94	,,	Ni.	=6	8·8	In t.22, 9·4.
,, 15	91	90	,,	Bh.	6−6, 16+6	9·5	
,, 18	94	,,	,,	,,	16+1	10·0	
,, 19	95	160	,,	Br.	16+1	10·0	
,, 20	96	T.94	,,	Ni.	=10, 16+2	9·8	
,, 22	0398	90	,,	Bh.	16−4, 24+5	10·6	
,, 24	0400	40	,,	La.	16−3, 20−2	10·6	
,, 25	01	T.94	,,	Ni.	16−5, 24+5	10·6	
,, 27	03	T.120	,,	Bn.	16−4, 20+1	10·5	
,, 29	05	90	2	Bh.	=24	11·1	
,, 30	06	160	1	Br.	=24	11·1	
Oct. 4	10	90	,,	Bh.	24−3, =26	11·4	
,, 6	12	T.94	,,	Ni.	26−2, 36+8	11·6	
,, 12	18	,,	,,	,,	26−8, 36+1·5	12·2	
,, 14	20	90	2	Bh.	=29, =33	12·0	
,, 16	22	,,	1	,,	=36, =38, =39	12·5	
,, 18	24	,,	,,	,,	=44, =45, =46	12·6	
,, 27	33	,,	,,	,,	=50	12·9	
Nov. 3	40	,,	,,	,,	50−1	13·0	
,, 7	44	150	,,	,,	50−1, 52+1	13·0	
,, 10	47	350	,,	,,	50−1, 54+1	13·1	
,, 10	47	160	,,	Br.	50−1, 54+2	13·0	
,, 12	49	T.94	,,	Ni.	50−2, 54+1	13·1	
,, 15	52	90	,,	Bh.	50−1, =52, 54+1	13·0	
,, 16	53	T.94	,,	Ni.	50−2, 54+1	13·1	
,, 17	54	150	,,	Bh.	52−1, 54+1	13·1	
,, 19	56	T.94	,,	Ni.	50−1, 54+2	13·0	
,, 20	0457	150	,,	Bh.	52−1, 54+2	13·1	

(2186) X AURIGÆ—*continued.*

Date	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Nov. 22	0459	150	I	Bh.	43−1, 45−2, 50+1	12·8	
„ 23	60	160	„	Br.	50−1, 54+2	13·0	
„ 26	63	150	„	Bh.	=45, =48	12·7	
„ 28	65	40	„	La.	26−6	12·0	
Dec. 1	68	90	„	Bh.	24−1, 26+1	11·3	
„ 7	74	„	2	„	16−8, =20, 26+4	10·8	
„ 7	74	160	I	Br.	24−2, 26+1	11·3	
„ 10	77	45	„	Bh.	16−1	10·2	
„ 13	80	T.94	„	Ni.	16−5, 24+5	10·6	
„ 14	81	160	„	Br.	16−2, 24+6	10·4	
„ 14	81	90	„	Bh.	16−2, 19+2	10·3	
„ 15	82	40	„	La.	16−1, 19+2, 20+3	10·3	
„ 19	86	45	„	Bh.	6−8, 16+4	9·7	
„ 20	87	T.94	„	Ni.	16+3	9·8	In t.22, 10·1.
„ 23	90	90	„	Bh.	6−6, 16+6	9·5	
„ 24	91	t.22	„	Ni.	6−7, 10+1	9·6	
„ 26	93	90	„	Bh.	5−3, 6+1, 9+6	8·9	
„ 29	0496	T.94	„	Ni.	6−1	8·9	

(2528) R GEMINORUM. (V. 1.)

H.D. 070122*a*.

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1907.							
Jan. 7	7583	240	I	Br.	16−4, 23+4	10·4	
Feb. 2	7609	160	„	„	31−4, 38+2	11·9	
„ 20	27	240	„	„	=31	11·5	
Mar. 4	39	183	2	Ma.	31−2, 40+2	11·8	
„ 8	43	„	I	„	31−4, 40+1	11·9	
„ 10	45	240	2	Br.	40−1	12·1	
„ 10	45	183	I	Ma.	31−4, 40+0·5	11·9	
„ 11	46	„	„	„	31−3, 40+1	11·9	
„ 19	54	„	2	„	=40	12·0	
Apr. 1	67	„	„	„	40−2	12·2	
„ 7	73	„	I	„	=40	12·0	
„ 17	83	240	„	Br.	40−3, =49	12·4	
May 2	7698	183	2	Ma.	=31, 40+2	11·7	
„ 4	7700	T.120	„	Bn.	=38	12·1	
„ 7	7703	183	I	Ma.	31−1·5, 40+3	11·7	

(2528) R GEMINORUM—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1907.							
Sept. 9	7828	t.30	1	Bn.	2−1, 3+7·5	7·5	
,, 14	33	,,	,,	,,	2−1, 4+4	7·5	
,, 19	38	,,	,,	,,	2−3, 4+2	7·7	
Oct. 4	53	,,	,,	,,	2−4, 4+0·5	7·9	
,, 12	61	,,	,,	,,	2−4, =4	7·9	
,, 31	80	T.50	,,	,,	5−1·5, 6+1	8·8	
Nov. 2	82	,,	,,	,,	5−1, =6	8·8	
,, 13	93	T.70	,,	,,	8−2, 9+1	9·2	
,, 15	7895	,,	,,	,,	9−1, 11+0·5	9·4	
,, 26	7906	80	,,	Br.	11−3, 13−1, 16+3	9·7	
,, 27	07	t.60	,,	Bn.	12−3, 16+1	9·9	
,, 28	08	T.50	,,	,,	12−3, 16+1	9·9	
Dec. 5	15	,,	,,	,,	12−3, =16	10·0	
,, 5	15	30	,,	D.R.	=19	10·3	
,, 10	20	t.85	,,	Bn.	16−1·5, 19+1	10·2	
1908.							
Jan. 3	44	t.120	,,	,,	28−3, =31, 39+4, 40+4	11·6	
,, 3	44	30	,,	D.R.	=24	10·8	Glimpsed.
,, 9	50	t.120	2	Bn.	28−5, 31−2, 38+3	11·8	
,, 10	51	,,	,,	,,	28−2, 31−1, 39+3, 40+6	11·5	
,, 29	70	160	1	Br.	31−4, 40+1	11·9	
Feb. 1	73	T.120	,,	Bn.	28−5, 31−3·5, 39+1, 40+1	11·9	
,, 6	78	T.150	,,	,,	28−6, 31−3·5, 39+1, 40+1	11·9	
,, 7	79	240	,,	Br.	=39, =40	12·0	
,, 8	80	T.167	,,	Bn.	31−4, 39+1, 40−1	12·0	
,, 23	95	T.200	,,	,,	40−5·5, 54+3	12·5	
,, 24	96	160	,,	Br.	40−3, 49+2, 54+4	12·3	
,, 24	7996	183	,,	Ma.	40−2·5	12·2	About.
,, 28	8000	T.200	,,	Bn.	40−5, 54+3·5	12·5	
Mar. 23	24	160	,,	Br.	=54	12·8	
,, 28	29	T.200	,,	Bn.	<40	<12·0	Not seen.
,, 31	32	160	2	Br.	<54	<12·8	Glimpsed.
April 2	34	240	1	,,	54−2, 56+1	13·1	
,, 4	36	38	,,	Gd.	<54	<12·8	Not seen.
,, 20	52	,,	2	,,	<43	<12·2	,, ,,
,, 26	58	240	1	Br.	<56	<13·2	Glimpsed.
May 10	8072	T.200	,,	Bn.	<38	<12·1	Not seen.
Oct. 19	8234	30	,,	D.R.	4−5, 6+2	8·5	
,, 24	39	,,	,,	,,	4−5, 5+2·5	8·4	
,, 30	8245	,,	,,	,,	4−6, 5+2	8·5	

(2528) R GEMINORUM—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1908.							
Nov. 17	8263	t.60	1	Bn.	5−1·5, 6+1	8·8	
" 22	68	30	2	D.R.	=9, =10	9·3	
" 23	69	T.70	1	Bn.	5−2, 6+0·5	8·8	
" 25	71	T.50	"	"	=6, 8+1	8·9	
" 26	72	T.70	"	"	6−1, =8	9·0	
Dec. 15	91	T.50	"	"	12−3, 16+1	9·9	
" 16	92	30	2	D.R.	16−1, 19+2	10·1	
" 18	8294	T.50	1	Bn.	12−2·5, 16+1	9·9	
" 28	8304	30	"	D.R.	15−2, 19+0·5	10·2	
1909.							
Jan. 11	18	t.75	"	Bn.	23−3, 25+1	11·0	
" 15	22	60	"	D.R.	19−4, 24+2	10·6	
" 19	26	160	"	Br.	31−2, 38+4	11·7	
" 19	26	t.85	"	Bn.	28−1·5, 31+1	11·4	
" 25	32	T.120	"	"	28−1, =31	11·4	
Feb. 7	45	T.95	"	"	28−2, 31+0·5	11·5	
" 12	50	30	2	D.R.	=30	11·4	
" 13	51	160	1	Br.	31−1, 39+4	11·6	
" 13	51	T.120	"	Bn.	28−5·5, 31−1, 39+4, 40+2	11·7	
" 17	55	"	"	"	28−5, 31−3, 39+1·5. 40+2	11·8	
" 19	57	"	"	"	28−5·5, 31−2, 39+2, 40+2	11·8	
" 20	58	160	"	Br.	31−2, 39+2	11·8	
" 21	59	T.167	"	Bn.	28−6, 31−3·5, 39+1, 41+1	11·9	
" 21	59	183	"	Ma.	40+2	11·8	
Mar. 14	80	160	"	Br.	=39, =40	12·0	
" 26	8392	"	"	"	40−3, 54+5	12·3	
Apr. 7	8404	T.150	"	Bn.	49−2	12·7	
" 18	15	160	"	Br.	54−2, 56+2	13·0	
May 8	8435	240	2	"	=56	13·2	
Sept. 6	8556	t.30	1	Bn.	1−13, 2+2	7·3	
" 7	57	"	"	"	1−12·5, 2+2	7·2	
" 9	59	"	"	"	1−12·5, 2+2	7·2	
Oct. 11	91	45	"	Br.	4+3	7·6	
" 14	94	30	"	D.R.	2−2, 3+6	7·6	
" 17	8597	60	"	Br.	4+1	7·8	
" 21	8601	30	"	D.R.	4+4	7·5	
" 21	01	T.50	"	Bn.	2−3, 4+1·5	7·8	
" 25	05	t.30	"	"	2−3, 4+1	7·8	
Nov. 4	15	30	2	D.R.	4−2·5, 3+1	8·2	
" 5	16	T.50	1	Bn.	4−1, 3+2	8·0	
" 7	18	"	"	"	4−1, 3+2·5	8·0	
" 7	18	45	"	Br.	4−1, 3+2	8·0	
" 8	8619	T.50	"	Bn.	4−1, 3+2	8·0	

(2528) R GEMINORUM—*continued.*

Date,	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1909.							
Nov. 10	8621	T.50	1	Bn.	4−2, 3+1	8·1	
,, 13	24	30	,,	D.R.	4−2, 3+1	8·1	
,, 15	26	T.50	,,	Bn.	4−2, 3+1	8·1	
,, 18	29	30	,,	D.R.	4−3, 3+1	8·2	
,, 19	30	45	,,	Br.	=3	8·3	
,, 21	32	t.60	,,	Bn.	5−0·5	8·7	
,, 22	33	30	2	D.R.	3−1, 5+2	8·4	
Dec. 4	45	160	1	Br.	=6	8·9	
,, 8	49	T.50	,,	Bn.	5−1·5, 6+1	8·8	Rather red.
,, 8	49	30	2	D.R.	8−2	9·2	
,, 15	56	,,	,,	,,	16+2	9·8	
,, 18	59	45	1	Br.	9−1, 13+3	9·4	
,, 20	61	T.50	,,	Bn.	9−0·5, =11	9·4	
,, 31	72	t.75	,,	,,	=16, 19+1	10·1	
,, 31	72	45	,,	Br.	=15, 19+4	10·0	
1910.							
Jan. 10	82	,,	,,	,,	15−3, =19	10·3	
,, 10	82	t.75	,,	Bn.	19−3, 20−0·5, 22+1	10·6	
,, 20	8692	160	,,	Br.	19−2, 22+3	10·5	
,, 30	8702	T.70	,,	Bn.	28−1·5, 31+1	11·4	
Feb. 2	05	183	,,	Ma.	31+5	11·0	
,, 4	07	T.120	,,	Bn.	28−1·5, 31+1	11·4	
,, 8	11	,,	,,	,,	28−2, 31+0·5	11·5	
,, 11	14	,,	,,	,,	31+0·5	11·5	
,, 11	14	80	,,	Br.	31−4, 39+1	11·9	Doubtful.
,, 15	18	T.120	,,	Bn.	28−3, 31−1, 39+4, 40+4·5	11·6	
,, 22	25	160	,,	Br.	=31	11·5	
Mar. 1	32	,,	,,	,,	31−1, 40+3	11·7	
,, 3	34	183	,,	Ma.	=40	12·0	
,, 4	35	,,	,,	,,	=38, 40−1	12·1	
,, 8	39	160	,,	Br.	=39, =40	12·0	
,, 14	45	79	,,	Ma.	=40	12·0	Glimpsed.
,, 15	46	160	,,	Br.	40−2, 49+2	12·3	
,, 16	47	T.120	,,	Bn.	40−3, 49+1·5	12·3	
,, 29	60	T.200	,,	,,	40−8, 49−1, 56+4	12·7	
,, 31	62	240	,,	Br.	=54	12·8	
Apr. 1	63	183	2	Ma.	40−4	12·4	Very difficult.
,, 2	64	T.167	1	Bn.	40−4, 49+1	12·4	
,, 25	8787	240	,,	Br.	54−2, 56+2	13·0	
May 8	8800	,,	,,	,,	=56	13·2	
,, 18	8810	,,	,,	,,	<39	<12·0	Not seen.
Sept. 19	8934	45	2	,,	2+2, 4+10	7·1	
Nov. 2	78	T.50	1	Bn.	2−3, 4+2	7·7	
,, 4	80	45	,,	Br.	2−5, 3+4, 4+2	7·8	
,, 11	87	,,	,,	,,	3+2	8·1	
,, 16	8992	T.50	,,	Bn.	3−0·5, 5+3	8·3	

(2528) R GEMINORUM—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Nov. 22	8998	T.50	1	Bn.	3−0·5, 5+3	8·3	
„ 25	9001	60	2	Gh.	6−2, =8, 9+2	9·1	
„ 28	04	30	1	„	6−1, =8, 9+2	9·0	
„ 29	05	45	1	Br.	3−4, 6+2	8·7	
Dec. 6	12	60	„	Gh.	8−2, =9, 16+8	9·2	
„ 20	26	160	„	Br.	6−3, 9+1	9·2	
„ 24	30	30	2	Gh.	=11, =13	9·5	
„ 27	33	t.75	1	Bn.	13−1, 14+0·5	9·7	
1911.							
Jan. 1	38	160	„	Br.	9−5, 19+5	9·8	
„ 1	38	t.60	„	Bn.	12−1, 16+3	9·7	
„ 1	38	60	„	Gh.	14−2, =15, =16, 19+2	10·0	
„ 6	43	45	„	F.G.B.	11−4, 16+2	9·8	
„ 7	44	60	2	Gh.	9−7, =19, 22+7	10·1	
„ 9	46	45	1	Br.	9−3, 19+7	9·6	
„ 23	60	160	„	„	19−2, 22+3	10·5	
„ 30	67	66	„	F.G.B.	19−4·5, 24+1	10·7	
„ 31	68	T.50	„	Bn.	19−1, 23+4	10·4	
„ 31	68	120	„	Gh.	=32, =34	11·7	Doubtful. [C.L.B.]
Feb. 22	90	66	„	F.G.B.	31−2, 40+2	11·8	
„ 25	93	160	„	Br.	=31	11·5	
„ 25	93	T.120	„	Bn.	28−4·5, 31−1, 39+4, 40+3	11·7	
Mar. 2	98	„	„	„	28−1, 31−1, 39+4, 40+5	11·5	
„ 2	9098	66	2	F.G.B.	=40	12·0	
„ 4	9100	160	1	Br.	31−1, 39+3	11·7	
„ 21	17	T.120	„	Bn.	40−1, 49+3	12·2	
Apr. 3	30	160	„	Br.	40−2, 54+6	12·2	
„ 19	46	„	„	„	=54	12·8	
„ 19	46	66	„	F.G.B.	=49	12·5	
„ 27	54	198	2	„	=56	13·2	
May 8	65	„	„	„	=40	12·0	Difficult.
„ 10	67	„	„	„	31−2, 40+2	11·8	
„ 14	9171	„	1	„	40−2	12·2	
Sept. 21	9301	60	2	Br.	1−10, 4+10	6·9	
Oct. 21	31	45	„	„	2+2	7·2	
„ 26	36	30	1	Gh.	4+7, 5+14	7·2	
„ 28	38	60	„	Br.	2+1	7·3	
„ 30	40	T.50	„	Bn.	=2	7·4	
„ 31	41	B.	2	F.G.B.	=2	7·4	
Nov. 12	53	30	1	Gh.	=4	7·9	
„ 12	53	t.30	„	Bn.	2−3·5, 4+1	7·8	
„ 12	53	45	„	F.G.B.	2−1·5, 4+3	7·6	
„ 20	9361	60	„	Br.	4−1, 3+4	8·0	

(2528) R GEMINORUM—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
Nov. 21	9362	T.50	1	Bn.	2−3·5, 4+1	7·8	
,, 27	68	57	2	Bh.	=3	8·3	
,, 29	70	,,	,,	,,	3−3, 6+3	8·6	
Dec. 4	75	,,	,,	,,	4−7, =5, 9+7	8·6	
,, 9	80	160	,,	Br.	3−4, 6+2	8·7	
,, 9	80	60	1	Gh.	=11	9·4	
,, 11	82	T.50	,,	Bn.	3−2, 5+1	8·5	
,, 11	82	57	2	Bh.	=6	8·9	
,, 11	82	45	1	F.G.B.	3−4, 6+2	8·7	
,, 15	86	T.50	,,	Bn.	5−1·5, 6+1	8·8	
,, 17	88	160	,,	Br.	6−2, 9+2	9·1	
,, 17	88	57	2	Bh.	=8	9·0	
,, 20	91	T.50	1	Bn.	5−2, 6+0·5	8·8	
,, 20	91	45	,,	F.G.B.	9−2, 13+2	9·5	
,, 24	9395	57	2	Bh.	=9	9·3	
,, 31	9402	,,	1	,,	6−3, =9, 11+3	9·2	
1912.							
Jan. 5	07	132	,,	F.G.B.	19−1·5, 22+3	10·4	
,, 7	09	45	,,	Br.	13−3, 19+3	10·0	
,, 11	13	90	2	Bh.	16−4, =19, 22+4	10·4	
,, 13	15	,,	,,	,,	16−4, =19, 23+4	10·4	
,, 20	22	,,	,,	,,	19−2, 22+2	10·5	
,, 21	23	160	1	Br.	19−4, 28+6	10·7	
,, 23	25	90	2	Bh.	=22, =23	10·8	
,, 26	28	,,	,,	,,	24−2, =25, =26, 28+2	11·0	
,, 27	29	,,	1	,,	23−4, =29, 31+4	11·2	
,, 27	29	T.50	,,	Bn.	=19	10·3	Doubtful. [C.L.B.]
Feb. 3	36	90	2	Bh.	=28, =29	11·3	
,, 8	41	160	1	Br.	28−1, 31+2	11·3	
,, 8	41	45	,,	F.G.B.	=22	10·8	
,, 10	43	90	,,	Bh.	29−2, =31, 32+2	11·5	
,, 14	47	,,	2	,,	=31, =32	11·6	
,, 22	55	160	1	Br.	31−2, 39+3	11·7	
,, 23	56	57	,,	Bh.	=30, =31, =32, =33	11·6	
,, 25	58	150	2	,,	31−5, =39, =40, 49+5	12·0	
,, 29	62	198	,,	F.G.B.	=40	12·0	
Mar. 3	65	90	,,	Bh.	=40	12·0	
,, 5	67	160	,,	Br.	=31	11·5	
,, 6	68	150	1	Bh.	=43	12·2	
,, 8	70	90	2	,,	=38, =39, =40	12·0	
,, 10	72	T.120	1	Bn.	28−6·5, 40+1	11·9	
,, 13	75	150	2	Bh.	=51, =52	12·7	
,, 15	77	,,	1	,,	=54	12·8	
,, 17	79	90	2	,,	=51, =52, =54	12·8	
,, 19	81	,,	1	,,	=51, =52	12·7	
,, 19	81	160	,,	Br.	40−2	12·2	
,, 26	9488	150	,,	Bh.	=52, =54	12·8	Glimpsed.

(2528) R GEMINORUM—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Apr. 6	9499	150	2	Bh.	<51	<12·7	Not seen.
„ 13	9506	160	1	Br.	54−1, 56+2	13·0	
„ 16	09	132	2	F.G.B.	43−2	12·4	Difficult.
„ 19	9512	„	1	„	50−2	12·7	
Aug. 30	9645	45	2	Bh.	=3	8·3	
Sept. 2	48	„	„	„	2−6, =4, 3+3	8·0	
„ 6	52	„	1	„	=2	7·4	
„ 17	63	„	2	„	=2	7·4	
„ 20	66	„	1	„	2−2, 4+1	7·7	
„ 21	67	„	„	Br.	2−2, 3+6	7·6	
„ 27	73	„	2	Bh.	2−4, 3+4	7·8	
Oct. 4	80	„	1	„	2−4, 3+4, =4	7·9	
„ 7	9683	„	2	„	2−6, 3+2, 4−2, 5+6	8·1	
„ 25	9701	„	„	„	=5, =6	8·8	
„ 29	05	„	„	Br.	4+3	7·6	
Nov. 1	08	„	1	„	4+1	7·8	
„ 11	18	„	„	„	4−2, 3+1	8·1	
„ 11	18	90	„	Bh.	6−2, =8, 9+2	9·1	
„ 19	26	45	2	„	3−3, =5, 6+3	8·6	
„ 25	32	„	„	„	=5	8·6	
„ 29	36	„	1	„	6−2, =7, =8, 9+2	9·0	
Dec. 6	43	160	„	Br.	6−2, 9+2	9·1	
„ 6	43	45	„	Bh.	7−2, =9, 10+2	9·2	
„ 10	47	„	„	„	9−2, =10, =11, 13+2	9·4	
„ 16	53	„	„	„	9−2, =10, =11, 13+2	9·4	
„ 25	62	„	„	„	=13, =14	9·7	
„ 28	65	„	„	„	13−3, =15, =16, 19+3	10·0	
„ 29	66	T.50	„	Bn.	12−2, 16+1	9·9	
„ 29	66	30	„	Gh.	9−6, =16, 19+4	9·9	
„ 31	68	45	„	Br.	13−4, 19+2	10·1	
„ 31	68	90	2	Bh.	14−5, =19, 22+5	10·3	
1913.							
Jan. 1	69	T.50	1	Bn.	16+1	9·9	
„ 2	70	45	2	Bh.	16−2·5, =19, 23+5	10·3	
„ 5	73	„	1	„	13−8, 16−4, 22+4, 23+4	10·4	
„ 13	81	90	2	„	19−2, =20, 22+2	10·5	
„ 15	83	160	„	Br.	19−2, 22+3	10·5	
„ 18	86	90	„	Bh.	15−5, 19−2, 22+2, 24+2·5	10·5	
„ 25	93	„	1	„	=22, =23, =24	10·8	
„ 26	94	T.95	„	Bn.	19−2, 23+3·5	10·5	
„ 31	9799	90	„	Bh.	26−2, =29, 30+2	11·3	
Feb. 3	9802	„	2	„	28−1, 30+1	11·3	
„ 4	03	160	1	Br.	=31	11·5	
„ 8	07	79	„	Ma.	23+1	10·7	Doubtful. [C.L.B.]
„ 8	9807	90	„	Bh.	30−2, =31, 33+2	11·6	

(2528) R GEMINORUM—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Feb. 11	9810	90	1	Bh.	=31	11·5	
,, 16	15	,,	2	,,	31−2, 39+2	11·8	
,, 21	20	,,	,,	,,	=32, =33	11·7	
,, 25	24	,,	1	,,	=32	11·7	
,, 25	24	160	,,	Br.	31−3, 38+3	11·8	
Mar. 3	30	90	,,	Bh.	=31, =33	11·6	
,, 7	34	,,	2	,,	=33, =34	11·7	
,, 8	35	120	1	Br.	31−2, 40+3	11·7	
,, 8	35	79	,,	Ma.	28−1, 31+2·5	11·3	
,, 11	38	T.150	,,	Bn.	31−3, 39+1·5	11·8	
,, 11	38	90	,,	Bh.	=38, =39, =40	12·0	
,, 11	38	120	,,	Th.	=40	12·0	
,, 15	42	90	,,	Bh.	33−4, =38, 49+4	12·1	
,, 24	51	T.120	2	Bn.	39−1	12·1	
,, 25	52	160	1	Br.	31−4, 40+1	11·9	
,, 25	52	90	,,	Bh.	43−3, =47, 54+3	12·5	
,, 28	55	183	,,	Ma.	40−6, 56+6	12·6	
,, 30	57	90	,,	Bh.	=43, =44, =46	12·3	
Apr. 1	59	183	,,	Ma.	40+1	11·9	
,, 4	62	157	,,	Th.	40−6, 54+2	12·6	
,, 5	63	90	,,	Bh.	=49, =54	12·7	
,, 14	72	120	2	Th.	<32	<11·7	Not seen.
,, 25	83	90	1	Bh.	<49	<12·5	,, ,,
,, 28	9886	120	,,	Br.	40−6, 54+2	12·6	
May 18	9906	180	2	Bh.	56−2	13·4	M.
,, 25	13	,,	,,	,,	54−5, 56−2	13·4	,,
Aug. 9	89	45	,,	,,	2+1	7·3	
,, 18	9998	,,	1	,,	1−4, 2+10	6·4	
,, 23	0003	,,	,,	,,	1−2	6·2	Dull red.
,, 27	07	,,	,,	,,	1−2	6·2	Orange.
,, 29	09	,,	,,	,,	=1	6·0	
Sept. 2	13	,,	2	,,	1−4, 2+10	6·4	
,, 4	15	,,	1	,,	=1	6·0	
,, 6	17	,,	,,	,,	1−2	6·2	Orange.
,, 7	18	,,	,,	Br.	1+2	5·8	
,, 9	20	,,	,,	Bh.	=1	6·0	Red.
,, 24	35	,,	,,	,,	=1	6·0	Orange red.
,, 27	38	,,	,,	,,	1−3·5, 2+11	6·3	
,, 27	38	,,	2	Br.	=1	6·0	About.
Oct. 4	45	,,	,,	Bh.	1−5, 2+5	6·7	
,, 6	47	,,	1	,,	1−7, 2+7	6·7	Dull red.
,, 9	50	F.	2	Th.	=d	6·5	
,, 12	53	45	,,	Bh.	1−9, 2+6	6·9	
,, 16	57	,,	1	,,	1−9, 2+6	6·9	
,, 16	57	37	2	Th.	2+7	6·7	About.
,, 22	63	45	1	Bh.	2+3	7·1	
,, 24	65	,,	,,	Br.	2+5	6·9	
,, 29	0070	,,	,,	Bh.	2+2	7·2	

(2528) R GEMINORUM—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Nov. 5	0077	45	1	Bh.	2−2, 4+2	7·7	
„ 5	77	62	„	Th.	2−2·5, 3+5	7·7	
„ 8	80	45	„	Bh.	2−3, 4+3	7·7	
„ 16	88	90	„	„	=3	8·3	
„ 17	89	62	2	Th.	4+2	7·7	
„ 21	93	90	1	Bh.	3−2, 4−3, 6+5	8·3	
„ 22	94	45	„	Br.	3+1	8·2	
„ 22	0094	62	„	Th.	3+0·5	8·2	
„ 28	0100	90	„	Bh.	5−2, =6	8·9	
Dec. 1	03	45	2	„	6−1·5, 7−1, 9+3	9·0	
„ 9	11	62	1	Th.	3−3, 6+3	8·6	
„ 12	14	„	„	„	=5	8·6	
„ 12	14	90	„	Bh.	6−3, 8−2, 9+1·5	9·2	
„ 16	18	„	„	„	8−2, =9	9·2	
„ 16	18	45	„	Br.	6−1, 9+3	9·0	
„ 16	18	62	2	Th.	5−1	8·7	
„ 22	24	120	1	„	11−3, 16+3	9·7	
„ 23	25	160	„	Br.	9−1	9·4	
„ 23	25	90	„	Bh.	11−2, =12, =13, 16+4	9·6	
„ 28	30	150	„	„	9−3, =13	9·6	
„ 30	32	T.50	„	Bn.	12−3, 16+1	9·9	
1914.							
Jan. 2	35	45	„	Br.	9−2	9·5	
„ 3	36	60	„	Th.	11−4, 16+1	9·9	
„ 5	38	„	„	„	11−3, 16+3	9·7	
„ 5	38	90	„	Bh.	8−7, =13, =14, 16+2	9·7	
„ 11	44	„	2	„	=14, =15, =16	10·0	
„ 14	47	45	1	„	16−2·5, =19, 23+5	10·3	
„ 22	55	60	2	Th.	16−4, 23+4	10·4	
„ 23	56	160	1	Br.	28−1, 31+1	11·4	
„ 23	56	150	2	Bh.	19−5, 28+5	10·8	
„ 26	59	60	1	Th.	=22	10·8	
„ 26	59	T.50	„	Bn.	19−4, 23+1	10·7	
„ 26	59	90	„	Bh.	25+1, 28+2	11·0	
Feb. 1	65	60	„	Th.	=23, =24	10·8	
„ 1	65	75	2	Ch.	=23	10·8	
„ 2	66	„	1	„	=29	11·3	
„ 2	66	150	„	Bh.	=28, 30+1, 31+2	11·3	
„ 2	66	T.95	„	Bn.	24−2, 28+2	11·0	
„ 4	68	157	2	Th.	=29	11·3	
„ 10	74	„	„	„	28+2	11·1	
„ 15	79	60	1	„	29−2, 31+2	11·4	
„ 15	79	90	„	Bh.	=31, 33+2	11·5	
„ 15	79	T.120	„	Bn.	28−5·5, 40+2	11·8	
„ 15	79	75	„	Ch.	=31	11·5	
„ 15	79	183	„	Ma.	=38, 54+2	12·4	Doubtful. [C.L.B.]
„ 18	82	160	„	Br.	=31	11·5	
„ 18	82	157	„	Th.	31−1·5	11·7	
„ 21	85	„	2	„	31−1·5, 39+3	11·7	
„ 21	85	90	1	Bh.	31−2, 39+2	11·8	
„ 24	0188	157	2	Th.	31−2	11·7	

(2528) R GEMINORUM—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Feb. 24	0188	T.120	1	Bn.	28−5·5, 31−1, 39+4, 40+2	11·7	
,, 26	90	75	,,	Ch.	=40	12·0	
Mar. 1	93	,,	,,	,,	40−1	12·1	
,, 1	0193	183	,,	Ma.	=40	12·0	
,, 10	0202	145	,,	Ch.	=40	12·0	
,, 16	08	,,	,,	,,	=43	12·2	
,, 16	08	120	,,	Br.	=39, =40	12·0	
,, 18	10	150	,,	Bh.	43−3, =47, 54+3	12·5	
,, 18	10	183	,,	Ma.	40−2·5, 54+5	12·3	
,, 19	11	140	2	Ch.	=43	12·2	About.
,, 21	13	T.150	1	Bn.	40−3·5, 49+2	12·3	
,, 27	19	120	,,	Br.	39−4, 54+4	12·4	
,, 27	19	T.167	,,	Bn.	49−1	12·6	
,, 29	21	150	2	Bh.	=51, =54	12·8	
,, 31	23	140	1	Ch.	=54	12·8	
Apr. 11	34	,,	,,	,,	54−2, 56+2	13·0	
,, 12	35	150	,,	Bh.	54−2, =56	13·1	
,, 14	37	183	,,	Ma.	=54, =56	13·0	
,, 16	39	140	2	Ch.	56−1	13·3	
,, 18	41	120	1	Br.	54−2, 56+2	13·0	
,, 19	42	150	2	Bh.	=54	12·8	
,, 26	0249	160	,,	Br.	=56	13·2	About. Difficult.
Aug. 7	0352	90	,,	Bh.	=12	9·6	
,, 11	56	,,	1	,,	9−2, =12, 19+7	9·6	
,, 14	59	,,	,,	,,	6−8, 9−3, =12	9·6	
,, 21	66	,,	,,	,,	6−3, 9+1·5	9·1	
,, 23	68	,,	,,	,,	6−4, 12+4	9·3	
,, 27	72	,,	,,	,,	6−4, =9, 12+4	9·3	
Sept. 1	77	,,	,,	,,	=6	8·9	
,, 5	81	,,	,,	,,	5−2, 6+1, 9+4	8·8	
,, 12	88	,,	,,	,,	4−5, =5, 6+5	8·5	
,, 19	95	,,	,,	,,	4−4, =3, 5+4	8·3	
,, 20	96	,,	,,	,,	4+1	7·8	Orange red.
,, 22	0398	,,	2	,,	3+2, 4−2	8·1	
,, 24	0400	45	1	,,	3+2, 4−2	8·1	
,, 30	06	,,	,,	Br.	3−1, 4+1	8·1	
Oct. 4	10	90	2	Bh.	3+2, =4	8·0	
,, 10	16	,,	1	,,	3+2, =4	8·0	
,, 18	24	,,	,,	,,	4−2·5, 6+7	8·2	
,, 21	27	,,	2	,,	=4	7·9	
,, 27	33	,,	1	,,	4−3, =3	8·2	
Nov. 3	40	,,	,,	,,	4−2·5, =3, 6+7	8·2	
,, 10	47	,,	,,	,,	3−4, 4−5, 5+2·5, 6+2	8·5	
,, 10	47	60	,,	Br.	3−1, 6+5	8·4	
,, 13	50	,,	,,	Th.	=3	8·3	
,, 15	52	90	,,	Bh.	5−1, 6+1	8·8	
,, 18	55	T.50	,,	Bn.	3−2, 5+1	8·5	
,, 22	0459	90	,,	Bh.	5−2, =6, 9+4	8·9	

(2528) R GEMINORUM—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Nov. 23	0460	45	1	Br.	3−2, 6+4	8·5	
„ 23	60	60	„	Th.	3−1	8·4	
Dec. 1	68	„	„	„	=3	8·3	
„ 1	68	90	„	Bh.	6−1·5, 9+3	9·0	
„ 7	74	„	„	„	6−2, 9+2	9·1	
„ 7	74	60	„	Th.	5+1	8·5	
„ 14	81	160	„	Br.	6−2, 9+2	9·1	
„ 14	81	90	„	Bh.	6−3, 9+1	9·2	
„ 19	86	„	„	„	6−3, 8−2, 9+1·5	9·2	
„ 26	93	„	„	„	6−3, 9+1	9·2	
„ 29	96	„	„	„	6−3, =9, 11+3	9·2	
„ 29	96	157	„	Th.	6−2, 9+2	9·1	
„ 31	0498	150	2	„	9−2	9·5	About.

(3493) R LEONIS. (V. 1.)

H.D. 094211.

NOTES.

Star A = *h* Leonis 5·30 R.H.P.

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Jan. 4	8676	160	1	Br.	u+6, y+12	8·4	
„ 10	82	„	„	„	u+4	8·6	
„ 10	82	t.30	2	Bn.	=s	8·7	
„ 11	83	50	1	Gi.	u−1, =13	9·0	
„ 20	92	160	„	Br.	u−1, y+5	9·1	
„ 24	8696	50	2	Gi.	u−2, y+5	9·2	
„ 30	8702	t.60	1	Bn.	u−2, y+5	9·2	
Feb. 1	04	50	„	Gi.	u−4, y+2	9·4	
„ 2	05	„	„	Ma.	u−5, y+1	9·5	
„ 4	07	T.70	„	Bn.	u−6, y+1	9·6	
„ 8	11	t.60	„	„	y−2, z+2	9·9	
„ 9	12	T.50	„	„	y−1, z+4	9·7	
„ 10	13	50	„	Gi.	=x, =y	9·7	
„ 11	14	160	„	Br.	u−3, y+2	9·4	
„ 15	18	t.60	„	Bn.	y−3, z+1·5	10·0	
„ 21	24	50	3	Gi.	y−2	9·8	
„ 21	24	160	2	Br.	u−4, y+3	9·4	
„ 28	8731	50	1	Ma.	y−3·5	10·0	

(3493) R LEONIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Mar. 1	8732	160	1	Br.	=y	9·6	
,, 2	33	50	2	Gi.	y−2	9·8	
,, 3	34	,,	1	Ma.	x−4, y−5	10·1	
,, 4	35	,,	,,	,,	x−10, β+1	10·7	
,, 6	37	,,	2	,,	x−9, β+2	10·6	
,, 8	39	160	1	Br.	y−2, z+3	9·8	
,, 10	41	50	,,	Gi.	y−2	9·8	
,, 13	44	79	2	Ma.	y−3·5	10·0	
,, 15	46	T.50	1	Bn.	z−5, β+2	10·6	
,, 15	46	160	,,	Br.	y−2	9·8	
,, 19	50	50	2	Ma.	y−5	10·1	
,, 25	56	,,	,,	,,	y−5	10·1	
,, 27	58	79	1	,,	y−5	10·1	
,, 27	58	T.50	,,	Bn.	y−4, z+1	10·0	
,, 31	62	45	,,	Br.	=y	9·6	
Apr. 1	63	t.60	,,	Bn.	y−4, z+1	10·0	
,, 4	66	50	2	Gi.	y−1	9·7	
,, 9	71	,,	,,	,,	y−1	9·7	
,, 10	72	79	1	Ma.	y−4	10·0	
,, 13	75	50	2	Gi.	=y	9·6	
,, 21	83	,,	1	Ma.	u−3, y+3	9·3	
,, 24	86	,,	,,	,,	u−4, y+2	9·4	
,, 25	87	160	,,	Br.	=u	9·0	
,, 26	88	50	,,	Ma.	u−3, y+3	9·3	
May 2	94	T.50	,,	Bn.	u+1	8·9	
,, 4	96	160	2	Br.	u−1	9·1	
,, 6	98	60	1	Bd.	=y	9·6	
,, 7	8799	50	,,	Ma.	u−4, y+2	9·4	Deep red.
,, 10	8802	60	,,	Bd.	u−4, y+2	9·4	
,, 12	04	t.60	,,	Bn.	u−5, y+1·5	9·5	
,, 13	05	60	,,	Bd.	u−1, y+4·5	9·1	
,, 14	06	t.60	,,	Bn.	u−4, y+1	9·5	
,, 15	07	79	2	Ma.	=u	9·0	
,, 16	08	,,	,,	,,	u+1	8·9	
,, 18	10	60	1	Br.	u+4	8·6	
,, 22	14	T.95	,,	Bn.	y−1·5	9·8	
,, 26	18	60	,,	Bd.	u−1, y+4·5	9·1	
,, 27	19	,,	2	Br.	q−2, u+5	8·4	
,, 30	22	,,	1	Bd.	u−1, y+4·5	9·1	
June 2	25	28	2	Ma.	u−3, y+3	9·3	2″·8 O.G.
,, 3	26	60	1	Bd.	=u	9·0	
,, 8	31	,,	,,	,,	=u	9·0	
,, 13	36	,,	,,	Br.	n−5, q+3	7·9	
,, 18	41	,,	2	Bd.	s−2·5, u+1	8·9	
,, 20	43	30	,,	,,	=s	8·7	
,, 23	46	,,	,,	,,	o−8, u+4	8·5	
,, 25	48	,,	1	,,	o−7, s+2	8·4	
,, 28	51	,,	,,	,,	q−2, s+2	8·4	
,, 29	52	,,	,,	,,	q−1, s+3	8·3	
,, 30	53	,,	2	,,	=q	8·2	
July 4	57	,,	1	,,	o−1, q+4	7·8	Orange red.
,, 9	8862	,,	2	,,	m−3, o+1·5	7·5	

(3493) R LEONIS—*continued.*

Date.		Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.								
July	11	8864	30	2	Bd.	m−1·5, o+3	7·4	
,,	12	65	,,	,,	,,	m−1, o+3·5	7·3	
,,	14	67	,,	,,	,,	k−4, m+1	7·1	
,,	18	71	,,	,,	,,	k−1, m+4	6·8	
,,	20	73	,,	,,	,,	=k	6·6	
,,	23	76	,,	,,	,,	=h	6·4	
,,	25	78	,,	,,	,,	f−4, h+2	6·2	
,,	26	8879	,,	,,	,,	f−3, h+3	6·1	
Nov.	4	8980	50	,,	Gi.	13+1, u+2	8·8	
,,	16	8992	45	1	Br.	u−2, y+4	9·2	
,,	29	9005	160	,,	,,	u−4, y+2	9·4	
,,	29	05	50	,,	Gi.	u−3, x+2	9·4	
Dec.	21	27	160	,,	Br.	x−3, z+1·5	10·0	
,,	26	32	50	2	Gi.	=y	9·6	
,,	29	35	t.60	1	Bn.	y−4, z+1	10·0	
,,	31	37	50	,,	Gi.	=y	9·6	
1911.								
Jan.	4	41	,,	,,	,,	y−1	9·7	
,,	6	43	t.60	,,	Bn.	z−5·5, β+1	10·7	
,,	9	46	,,	,,	,,	y−4, z+0·5	10·1	
,,	9	46	45	,,	Br.	z−2, α+2	10·3	
,,	9	46	60	2	Go.	z−1, 23+1	10·2	
,,	10	47	,,	,,	,,	=24	10·4	
,,	19	56	,,	1	,,	=26, =α	10·5	
,,	19	56	160	,,	Br.	α+1	10·4	
,,	20	57	,,	,,	,,	=α	10·5	
,,	21	58	50	2	Gi.	y−2	9·8	
,,	28	65	60	1	Go.	=26	10·5	
,,	30	67	t.60	,,	Bn.	β−2	11·0	
,,	31	68	T.50	,,	,,	α−0·5	10·5	
,,	31	68	30	,,	Gh.	=24, =25	10·4	
Feb.	4	72	60	,,	Go.	=26	10·5	
,,	11	79	45	,,	Br.	y−3	9·9	
,,	16	84	60	,,	Go.	=α	10·5	
,,	18	86	,,	,,	Bd.	=z	10·1	
,,	20	88	,,	,,	Go.	=26	10·5	
,,	22	90	,,	,,	Bd.	=z	10·1	
,,	25	93	,,	,,	,,	=z	10·1	
,,	25	93	45	,,	Br.	y−5, z−1	10·2	
,,	25	93	T.95	,,	Bn.	z−2·5, α+1	10·4	
Mar.	2	9098	60	,,	Go.	=24, =α	10·4	
,,	4	9100	45	,,	Br.	u−4, y+2	9·4	
,,	6	02	60	,,	Bd.	=z	10·1	
,,	7	03	T.50	,,	Bn.	y−3, z+1·5	10·0	
,,	17	13	60	,,	Bd.	y−1·5, z+3	9·8	
,,	21	17	,,	,,	,,	=y	9·6	
,,	21	17	T.120	,,	Bn.	y−1	9·7	
,,	23	19	60	,,	Bd.	=y	9·6	
,,	27	23	,,	,,	,,	=u	9·0	
,,	30	9126	,,	,,	,,	s−3, u+1	8·9	

(3493) R LEONIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
Apr. 3	9130	45	1	Br.	u+2	8·8	
„ 4	31	60	„	Bd.	s−2, u+1	8·9	
„ 16	43	t.30	„	Bn.	o−4·5, q+1	8·1	Very red.
„ 17	44	30	„	Bd.	=s	8·7	
„ 19	46	„	„	„	q−3, s+1	8·5	
„ 19	46	45	„	Br.	q−1, u+7	8·3	
„ 20	47	30	„	Bd.	q−2, s+2	8·4	
„ 23	50	t.30	„	Bn.	o−4·5, q+1	8·1	
„ 26	53	45	2	Br.	n−4	7·9	
„ 28	55	30	1	Bd.	q−1, s+2	8·4	
May 2	59	„	„	„	q−1, s+3	8·3	
„ 2	59	T.25	„	Bn.	o−2	7·9	
„ 9	66	45	„	Br.	k−5, m+1	7·1	
„ 14	71	t.30	„	Bn.	k−4, m+1	7·1	
„ 15	72	30	„	Bd.	o−1·5, q+4	7·8	
„ 18	75	40	„	Gi.	h−3	6·7	
„ 19	76	30	„	Bd.	m−3, o+1	7·6	
„ 21	78	45	„	Br.	k−3, m+3	6·9	
„ 21	78	t.30	„	Bn.	k−5, m+1	7·1	
„ 23	80	30	„	Bd.	m−1·5, o+3	7·4	
„ 24	81	t.30	„	Bn.	h−1, =k	6·6	
„ 24	81	34	„	Cr.	k−3, m+3	6·9	
„ 25	82	30	„	Bd.	m−1, o+3·5	7·3	
„ 26	83	„	„	„	=m	7·2	
„ 27	84	t.30	„	Bn.	h−1, k+1	6·5	
„ 27	84	B.	2	Gi.	h−3, k−1	6·7	
„ 28	85	45	1	Br.	=h	6·4	
„ 28	85	15	2	Go.	m−1, n+2	7·3	
„ 29	86	t.30	1	Bn.	=h	6·4	
„ 29	86	34	„	Cr.	h−1, k+1	6·5	
„ 30	87	30	„	Bd.	k−4, m+1	7·1	
June 1	89	t.30	„	Bn.	f−5, h+1	6·3	
„ 1	89	30	„	Bd.	k−3, m+3	6·9	
„ 1	89	34	„	Cr.	=h	6·4	
„ 3	91	B.	2	Gi.	h−2, k+1	6·6	
„ 7	95	34	1	Cr.	f−2, h+4	6·0	
„ 7	95	t.30	„	Bn.	f−4, h+2	6·2	
„ 8	96	34	„	Cr.	f−1	5·9	
„ 8	9196	B.	„	Gi.	=h	6·4	
„ 13	9201	30	„	Bd.	k−2, m+4	6·8	
„ 14	02	„	„	„	=k	6·6	
„ 14	02	B.	2	Gi.	h−1	6·5	
„ 15	03	„	1	„	=h	6·4	
„ 19	07	45	„	Br.	=f	5·8	
„ 19	07	30	„	Bd.	=h	6·4	
„ 22	10	B.	„	Gi.	=h	6·4	
„ 23	11	30	„	Bd.	f−4, h+1	6·3	
„ 28	16	„	„	„	f−3, h+3	6·1	
„ 28	16	60	„	Go.	f−1, h+4	6·0	
July 16	34	30	„	„	f−1·5, h+4	6·0	
„ 17	35	„	„	Bd.	h−0·5, k+1	6·5	
„ 18	36	„	„	„	=h	6·4	
„ 19	9237	„	„	„	=k	6·6	

(3493) R LEONIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
July 20	9238	30	1	Bd.	k−2, m+4	6·8	
,, 21	39	,,	,,	,,	k−3, m+3	6·9	
,, 22	40	,,	,,	,,	k−4, m+2	7·0	
,, 22	40	60	2	Go.	f−3, h+2	6·2	
,, 24	42	,,	,,	,,	f−4, h+1	6·3	
,, 28	9246	,,	,,	,,	=h	6·4	
Sept. 20	9300	40	1	Gi.	7−2, q+3	8·0	
Oct. 3	13	60	,,	Go.	u−1, x+5	9·1	
Nov. 3	44	40	,,	Gi.	u−2, y+2	9·3	
,, 16	57	,,	,,	,,	u−3, y+2	9·4	
Dec. 1	72	,,	,,	,,	u−3, y+2	9·4	
,, 10	81	,,	,,	,,	u−4, y+1	9·5	
,, 11	82	45	,,	Br.	y−3	9·9	
,, 15	86	160	,,	,,	y−2	9·8	
,, 18	89	40	,,	Gi.	u−3, y+1	9·4	
,, 24	95	,,	2	,,	=y	9·6	
,, 25	9396	,,	,,	,,	y−2, x+1	9·7	
,, 29	9400	,,	1	,,	u−1, y+2	9·3	
1912.							
Jan. 1	03	,,	2	,,	u−2, y+2	9·3	
,, 7	09	T.94	1	Bl.	u+0·5	8·9	
,, 8	10	40	3	La.	u−5, y+1·5	9·5	
,, 10	12	,,	1	Gi.	u−2, y+4	9·2	
,, 11	13	160	,,	Br.	u−4, y+2	9·4	
,, 17	19	t.22	,,	Bl.	u−5, y+1	9·5	
,, 21	23	60	,,	Go.	u−3, y+3	9·3	
,, 25	27	50	2	Gi.	=13, u+2	8·9	
,, 27	29	t.22	1	Bl.	q−3, t+2	8·6	
,, 27	29	160	,,	Br.	u−2, y+4	9·2	
,, 28	30	60	,,	Go.	u−3, y+3	9·3	
,, 28	30	T.50	,,	Bn.	q−3, s+1	8·5	
Feb. 2	35	45	,,	Br.	=q, u+10	8·1	
,, 10	43	t.22	,,	Bl.	q−2, t+4	8·4	
,, 10	43	57	2	Bh.	=13, =u	9·0	
,, 11	44	50	,,	Gi.	q−2, t+2	8·5	At Catania.
,, 11	44	40	1	La.	=13	9·0	
,, 12	45	30	,,	Go.	s−2, 13+2	8·8	
,, 14	47	57	2	Bh.	=13, =u	9·0	
,, 15	48	40	,,	La.	s−1, u+3	8·7	
,, 18	51	30	,,	Go.	q−3, t+3	8·5	
,, 20	53	40	1	La.	q−1, t+4	8·4	
,, 20	53	90	2	Bh.	=s, =t	8·8	
,, 21	54	t.22	1	Bl.	n−2, q+6	7·7	
,, 23	56	50	2	Gi.	=q	8·2	
,, 23	56	57	1	Bh.	n−6, =q, t+6	8·2	Ruby red.
,, 23	56	45	,,	Br.	=n	7·5	
,, 25	58	30	,,	Go.	q−2, t+4	8·4	
,, 26	59	57	2	Bh.	n−3, =7, p+3	7·8	Ruby red.
,, 27	9460	20	,,	La.	p−3, q−1	8·3	

(3493) R LEONIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Feb. 28	9461	40	1	La.	q−1, t+4	8·4	
„ 29	62	57	2	Bh.	=m, =n	7·4	
Mar. 6	68	t.22	1	Bl.	=m, n+1	7·3	
„ 6	68	45	„	Br.	m−1, n+1	7·4	
„ 6	68	57	„	Bh.	h−5, k−3, m+3, n+5	6·9	Red.
„ 6	68	T.50	„	Bn.	m+1	7·1	
„ 8	70	57	2	Bh.	l−2, m+2	7·1	
„ 8	70	40	„	La.	n−4, p+1·5	7·9	
„ 9	71	20	„	„	n−3, p+3	7·7	
„ 10	72	„	„	„	=p	8·0	
„ 10	72	30	1	Go.	m−3·5, q+6	7·6	
„ 10	72	T.25	„	Bn.	m−3·5, o+1	7·6	
„ 11	73	20	„	La.	n−4, p+2	7·8	
„ 13	75	40	„	Gi.	l−4, m+2	7·2	
„ 14	76	20	2	La.	n−3, p+3	7·7	
„ 15	77	57	1	Bh.	=k, =l	6·8	Orange red.
„ 17	79	30	„	Go.	m−3, p+5	7·5	Orange.
„ 19	81	40	„	Gi.	l−2, m+2	7·1	
„ 19	81	20	„	La.	m−1·5, n+1	7·4	
„ 19	81	45	„	Br.	k−3, m+2	7·0	
„ 19	81	57	„	Bh.	=k	6·6	Red.
„ 20	82	t.22	„	Bl.	=h	6·4	
„ 22	84	B.	2	Ma.	f−6	6·4	
„ 23	85	40	1	Gi.	l−2, m+4	7·0	
„ 23	85	20	„	La.	m−1, n+1	7·4	
„ 23	85	57	„	Bh.	h−4, =l, m+4	6·8	Orange red.
„ 24	86	30	„	Go.	n−1, p+4·5	7·6	Orange.
„ 26	88	57	2	Bh.	=k	6·6	
„ 28	90	„	„	„	h−1, k+1	6·5	Orange.
„ 28	90	20	1	La.	h−1, k+1	6·5	
„ 30	92	„	„	„	=h	6·4	Red.
„ 31	93	57	2	Bh.	=h	6·4	
April 1	94	T.25	1	Bn.	f−3, h+2	6·2	
„ 1	94	t.22	2	Bl.	f−1, h+5	5·9	
„ 2	95	57	1	Bh.	=h	6·4	Ruby.
„ 3	96	20	„	La.	f−4, h+1	6·3	
„ 3	96	B.	„	Ma.	f−5, h−1	6·4	
„ 3	96	T.50	„	Bn.	f−4, h+2	6·2	
„ 4	97	40	„	Gi.	f−4, h+2	6·2	In B. 6·2.
„ 4	97	20	„	La.	f−3, h+3	6·1	
„ 6	99	45	„	Bh.	f−3, h+3	6·1	Orange red.
„ 6	9499	B.	„	Ma.	f−2, =h	6·2	
„ 7	9500	30	„	Go.	f−2, h+4	6·0	Orange.
„ 8	01	20	„	La.	f−1·5, h+5	6·0	
„ 8	01	40	„	Gi.	f−2, h+5	6·0	
„ 8	01	45	„	Bh.	=f	5·8	Orange red.
„ 8	01	B.	„	Br.	f−3, h+3	6·1	
„ 10	03	20	2	La.	e−1, f+1	5·7	
„ 10	03	B.	1	Gi.	e−3, f+2	5·8	
„ 10	03	45	2	Bh.	=f	5·8	
„ 11	04	B.	1	Bn.	f+1	5·7	
„ 11	04	45	„	Bh.	=e	5·6	
„ 13	9506	„	„	Br.	f+2	5·6	Orange.

(3493) R LEONIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Apr. 13	9506	B.	2	Gi.	=e, f+3	5·6	
„ 13	06	20	1	La.	=e, f+1	5·7	
„ 14	07	B.	2	Ma.	f+5, h+8	5·5	
„ 14	07	30	1	Go.	=e	5·6	Orange.
„ 16	09	B.	„	Br.	d−2, =e, f+2	5·6	
„ 18	11	„	2	Ma.	f+8, h+10	5·2	
„ 19	12	„	1	R.B.	d−1, f+3	5·5	
„ 19	12	30	„	Gh.	f+1·5, h+7	5·7	
„ 19	12	45	„	Bh.	f+6	5·2	
„ 19	12	„	„	Br.	f+5	5·3	In B. 5·5.
„ 20	13	B.	„	„	=d	5·5	
„ 21	14	20	2	La.	=e	5·6	
„ 21	14	B.	1	R.B.	d−2, e+1	5·6	
„ 21	14	„	2	Go.	e−2, f+1	5·8	Orange.
„ 22	15	„	1	Gi.	c−1, d+2	5·3	
„ 22	15	„	„	Bl.	=A	5·3	Visible to N.E.
„ 23	16	20	„	La.	c−1, d+1	5·3	
„ 23	16	B.	„	R.B.	d−2, e+1	5·6	
„ 23	16	„	2	Bh.	=c	5·2	
„ 24	17	„	1	La.	=c	5·2	
„ 25	18	45	2	Bh.	=c, f+6	5·2	In B. 5·2.
„ 26	19	20	„	La.	=c	5·2	
„ 28	21	45	1	Br.	f+5	5·3	
„ 28	21	30	2	Go.	=e	5·6	Orange.
„ 29	22	45	1	Bh.	=c, f+5	5·3	In B. 5·5.
„ 29	22	B.	„	R.B.	d−1, =e	5·6	
May 1	24	„	„	„	d−1, e+1	5·5	
„ 1	24	„	2	Go.	e−1, f+1	5·7	Orange.
„ 1	24	„	1	Bl.	A−1, f+3	5·5	
„ 3	26	„	„	Gi.	c−1·5, d+2	5·3	
„ 4	27	„	„	La.	d−1, e+1	5·5	
„ 5	28	„	„	Go.	d−1, e+1	5·5	
„ 6	29	20	„	La.	c−1, d+2	5·3	
„ 6	29	B.	„	Ma.	f+7, h+10	5·3	
„ 7	30	20	„	La.	c−1, d+1	5·3	
„ 7	30	B.	2	Gi.	=d	5·5	
„ 8	31	„	„	Ma.	f+6, h+9	5·4	
„ 8	31	„	1	Bn.	d−1, =e	5·6	
„ 9	32	20	„	La.	=c	5·2	
„ 9	32	B.	2	Gi.	c−1, d+1	5·3	
„ 10	33	„	„	Ma.	f+4, h+7	5·6	
„ 11	34	20	1	La.	=d	5·5	
„ 11	34	B.	„	Gi.	c−2·5, d+1	5·4	
„ 12	35	45	2	Bh.	f+6	5·2	
„ 13	36	20	1	La.	c−2, d+1	5·4	
„ 13	36	B.	„	Gi.	c−2, d+1	5·4	
„ 16	39	45	„	Bh.	=e, f+2	5·6	
„ 16	39	B.	„	Bl.	=A	5·3	
„ 17	40	45	2	Bh.	f+1	5·7	
„ 17	40	B.	1	Gi.	=d, e+2	5·4	
„ 17	40	„	„	Bn.	e−1, =f	5·8	
„ 18	41	20	„	La.	d−1, e+2	5·5	
„ 18	41	B.	„	Ma.	f+3, h+6	5·7	
„ 18	41	60	2	Br.	f+2	5·6	
„ 20	9543	45	1	Bh.	=f	5·8	

(3493) R LEONIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
May 23	9546	45	2	Bh.	=f	5·8	
„ 24	47	30	1	Gh.	=f	5·8	
„ 24	47	T.50	„	Bn.	f+2	5·6	
„ 25	48	20	2	La.	=d	5·5	
„ 25	48	45	„	Bh.	f−1	5·9	
„ 27	50	B.	1	Gi.	e−2, f+1	5·8	
„ 27	50	„	2	Ma.	f+1, h+8	5·7	
„ 27	50	20	„	La.	d−1, e+1	5·5	Orange.
„ 28	51	45	„	Bh.	=f	5·8	
„ 30	53	t.22	„	Bl.	f+4	5·4	
„ 31	54	20	1	La.	e−1, f+1	5·7	
June 2	56	T.50	„	Bn.	f−3, h+2	6·2	
„ 2	56	B.	2	Go.	=f	5·8	
„ 2	56	20	1	La.	e−1·5, =f	5·8	
„ 4	58	40	„	Gi.	f−2, h+4	6·0	
„ 4	58	„	„	La.	e−1, f+1	5·7	
„ 6	60	45	2	Bh.	f−2	6·0	
„ 6	60	„	1	Br.	f−1	5·9	
„ 8	62	40	„	Gi.	f−4, h+3	6·2	
„ 8	62	20	„	La.	=f	5·8	
„ 10	64	t.30	„	Bn.	f−3, h+3	6·1	
„ 10	64	30	„	Gh.	=h	6·4	
„ 11	65	20	„	La.	f−1, h+5	5·9	
„ 13	67	T.50	„	Bn.	f−3, h+2	6·2	
„ 13	67	45	2	Bh.	f−4	6·2	
„ 15	69	20	1	La.	f−2, h+4	6·0	
„ 18	72	30	„	Go.	f−3, h+3	6·1	
„ 19	73	40	„	Gi.	f−5, h+2	6·3	
July 12	9596	30	2	Go.	h−3·5	6·8	About.
„ 19	9603	„	1	„	m−4, =n, q+6	7·6	
Aug. 30	45	45	2	Bh.	<n	< 7·5	Invisible.
Sept. 21	67	40	3	Gi.	=x	9·7	
„ 23	69	„	„	La.	<y	< 9·6	Not seen.
Oct. 3	79	T.94	2	Bl.	y−1·5	9·8	
„ 7	83	90	„	Bh.	y−4, α+4	10·0	
„ 10	86	40	„	Gi.	x−3	10·0	
„ 11	87	„	3	La.	x−4	10·1	
„ 14	90	„	2	„	z−2, α+2	10·3	
„ 15	9691	„	1	Gi.	y−3·5, z−1, α+2	10·2	
„ 31	9707	T.94	„	Bl.	y−6, α+3	10·2	
Nov. 4	11	40	2	Gi.	z−2, α+1	10·3	
„ 7	14	„	1	La.	z−2, α+1	10·3	
„ 8	15	90	„	Bh.	=z, =23	10·2	Pale red.
„ 11	18	„	2	„	x−4, =z, 25+4	10·1	
„ 13	20	40	„	La.	z−2, α+2	10·3	
„ 19	26	90	„	Bh.	y−2, z+2	9·9	
„ 29	36	„	„	„	y−2, z+2	9·9	Red.
Dec. 3	40	40	1	La.	z−1, α+2	10·2	
„ 4	9741	„	„	Gi.	z−3, α+2	10·3	

(3493) R LEONIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Dec. 4	9741	T.94	1	Bl.	y−6, α+3	10·2	
" 5	42	90	"	Bh.	y−3, α+6	9·9	
" 6	43	160	2	Br.	x−2, z+2	9·9	
" 7	44	40	1	La.	=z	10·1	
" 9	46	"	"	Gi.	u−3, y+1	9·4	
" 11	48	"	2	La.	=z	10·1	
" 11	48	90	1	Bh.	=x, =y	9·7	
" 16	53	"	"	"	=x, =y	9·7	Red.
" 20	57	40	2	Gi.	=y	9·6	
" 29	66	T.94	1	Bl.	=y	9·6	
1913.							
Jan. 1	69	160	"	Br.	y−2	9·8	
" 1	69	T.50	"	Bn.	z−2·5, β+5	10·4	
" 3	71	40	2	Gi.	u−3, y+1	9·4	
" 3	71	T.94	1	Bl.	u−5, y+1	9·5	In t.22, 9·8.
" 5	73	45	2	Bh.	u−3, w−3, x+3, y+3	9·4	
" 6	74	40	1	Gi.	u−3, y+1	9·4	
" 6	74	"	2	La.	y−1	9·7	
" 9	77	45	1	Bh.	w−3, x+3	9·4	
" 12	80	"	"	"	u−2, 18+2, y+4	9·3	
" 12	80	40	2	Gi.	u−3, y+2	9·4	
" 18	86	160	1	Br.	u+1	8·9	
" 18	86	90	"	Bh.	u−3, y+3	9·3	
" 25	93	45	"	"	t−4, u−2, 18+4	9·2	
" 26	94	"	"	Br.	u+2	8·8	
" 26	94	T.95	"	Bn.	u+1	8·9	
" 26	94	t.22	"	Bl.	u−3, y+3	9·3	
" 29	97	45	2	Bh.	s−3, =u, 15+3	8·9	
" 31	99	"	1	"	q−4, =s, 13+4	8·6	
" 31	99	T.50	"	Bn.	u+2	8·8	
" 31	9799	50	"	Ma.	u+5	8·5	Red.
Feb. 3	9802	40	"	Gi.	q−3, t+3	8·5	
" 4	03	45	2	Bh.	=t, =s	8·8	
" 5	04	t.22	1	Bl.	=q	8·2	
" 8	07	45	2	Br.	u+5	8·5	
" 8	07	T.50	"	Bn.	q−2	8·4	
" 8	07	t.22	1	Bl.	n−4, q+4	7·8	
" 9	08	20	"	La.	q−1, s+3	8·3	
" 11	10	79	2	Ma.	u+5	8·5	
" 12	11	45	1	Bh.	n−3, =7, p+3	7·8	
" 13	12	20	"	La.	=q	8·2	
" 15	14	"	"	"	p−1, q+1	8·1	
" 15	14	40	"	Gi.	n−1, p+4	7·6	
" 16	15	45	"	Bh.	m+1, n+2	7·2	
" 21	20	"	"	"	=k	6·6	Scarlet.
" 22	21	T.25	"	Bn.	h−1, k+1	6·5	Very red.
" 22	21	t.22	"	Bl.	h−1, k+1	6·5	
" 23	22	20	"	La.	=k	6·6	
" 24	23	"	2	"	k−1	6·7	Orange.
" 25	24	45	1	Br.	k−2, m+4	6·8	
" 25	24	24	"	Bo.	h−6, m+3	7·0	
" 25	24	20	"	La.	h−1, k+1	6·5	Orange red.
" 27	9826	45	2	Bh.	h−1, k+1	6·5	

(3493) R LEONIS—*continued.*

Date.		Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.								
Mar.	1	9828	20	2	La.	=k	6·6	
,,	2	29	14	1	Bo.	=l	6·9	
,,	2	29	30	,,	Go.	=n	7·5	
,,	3	30	45	2	Bh.	h−3, =k, m+6	6·7	
,,	3	30	40	1	Gi.	k−1, m+4	6·8	
,,	3	30	20	2	La.	=k	6·6	
,,	5	32	t.22	1	Bl.	=h, k+1·5	6·5	In B. 7·0.
,,	5	32	20	,,	La.	h−2, =k	6·6	
,,	6	33	45	2	Bh.	h−4, m+4	6·8	
,,	7	34	20	1	La.	=h	6·4	Red.
,,	8	35	14	,,	Bo.	=k	6·6	
,,	8	35	50	,,	Ma.	f−7. h−1·5	6·6	Red.
,,	8	35	T.25	,,	Bn.	k−4, m+2	7·0	
,,	8	35	30	,,	Go.	=m	7·2	
,,	8	35	,,	2	Ln.	h−1, m+3	6·7	
,,	10	37	F.	1	Bl.	h−0·5, k+2	6·5	In B. 7·0.
,,	11	38	45	,,	Br.	h−3	6·7	
,,	11	38	,,	,,	Bh.	=h	6·4	Orange red.
,,	11	38	T.25	,,	Bn.	h−1, =k	6·6	Red.
,,	11	38	40	,,	Gi.	k−2, m+4	6·8	
,,	11	38	20	,,	La.	f−4, h+1	6·3	
,,	11	38	30	,,	Ln.	h−2, n+9	6·6	
,,	15	42	14	,,	Bo.	=h	6·4	
,,	15	42	45	,,	Bh.	=h	6·4	
,,	16	43	30	,,	Go.	k−4, m+2	7·0	
,,	18	45	14	,,	Bo.	=h	6·4	
,,	20	47	90	,,	Bh.	h+1	6·3	
,,	20	47	t.22	,,	Bl.	=h	6·4	
,,	21	48	14	,,	Bo.	h−1, =k	6·6	
,,	22	49	,,	,,	,,	f−4, h+2	6·2	
,,	23	50	T.25	,,	Bn.	f−4·5, h+1	6·3	
,,	25	52	160	,,	Br.	h−1	6·5	Very red.
,,	25	52	45	,,	Bh.	=h	6·4	
,,	25	52	F.	,,	Bl.	=h	6·4	In B. 6·9.
,,	27	54	14	2	Bo.	=h	6·4	
,,	27	54	45	1	Bh.	h+1	6·3	
,,	27	54	30	,,	Ln.	h−1, m+3	6·7	
,,	28	55	25	,,	Wd.	h−1, k+1	6·5	
,,	28	55	50	2	Ma.	f−8, h−2	6·6	Orange.
,,	30	57	45	1	Bh.	h+2	6·2	
,,	30	57	t.30	,,	Bn.	h−1, =k	6·6	
,,	30	57	20	,,	La.	h−2, =k	6·6	
,,	31	58	25	,,	Wd.	=h	6·4	
Apr.	1	59	t.22	,,	Bl.	=h, k+1·5	6·5	In B. 7·0.
,,	1	59	50	,,	Ma.	f−7, h−1·5	6·6	Pale crimson.
,,	2	60	14	,,	Bo.	=h	6·4	
,,	3	61	25	,,	Wd.	=h	6·4	
,,	4	62	45	,,	Bh.	h+2	6·2	
,,	6	64	20	,,	La.	=h	6·4	Orange red.
,,	7	65	14	,,	Bo.	m−1, n+2	7·3	
,,	7	65	45	,,	Bh.	h+1	6·3	
,,	8	66	14	,,	Bo.	=m	7·2	
,,	11	69	45	2	Bh.	h−1	6·5	
,,	12	70	14	1	Bo.	l−2, m+1	7·1	
,,	12	9870	25	,,	Wd.	=k	6·6	

(3493) R LEONIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Apr. 12	9870	p.16	1	Bn.	k−1	6·7	p=2″ O.G.
„ 13	71	t.22	„	Bl.	h−0·5, k+1	6·5	
„ 14	72	20	2	La.	k−1, l+2	6·7	
„ 14	72	25	1	Wd.	k−1	6·7	
„ 16	74	45	„	Bh.	h−2, =k	6·6	
„ 19	77	14	„	Bo.	l−2, m+1	7·1	
„ 19	77	t.22	„	Bl.	h−0·5, k+1	6·5	
„ 20	78	45	„	Bh.	h−3, =k	6·7	
„ 21	79	25	„	Wd.	k−2, m+4	6·8	
„ 22	80	14	2	Bo.	m−2, n+1	7·4	
„ 22	80	50	1	Ma.	f−7, h−1·5	6·6	
„ 23	81	30	2	Ln.	h−9, m−1, n+2	7·3	
„ 23	81	14	1	Bo.	m−1, n+2	7·3	
„ 25	83	45	„	Bh.	l−3, =m, n+3	7·2	
„ 26	84	14	„	Bo.	m−2, n+1	7·4	
„ 26	84	25	„	Wd.	m+2	7·0	
„ 26	84	t.22	„	Bl.	=k	6·6	
„ 27	85	30	„	Go.	m−2, q+6	7·5	
„ 27	85	45	„	Bh.	=m, n+1	7·3	
„ 28	86	14	„	Bo.	=n	7·5	
„ 28	86	45	„	Br.	k−3, m+3	6·9	
„ 28	86	20	2	La.	=n	7·5	
„ 29	87	14	1	Bo.	m−2, n+1	7·4	
„ 30	88	20	2	La.	m−3, =n	7·5	
May 1	89	T.25	1	Bn.	k−2, m+4	6·8	
„ 1	89	30	„	Gh.	=n	7·5	
„ 2	90	45	„	Bh.	m−2, n+1	7·4	
„ 3	91	t.22	„	Bl.	k−4, m+1	7·1	
„ 4	92	20	2	La.	=n	7·5	
„ 6	94	40	1	„	=p	8·0	
„ 6	94	T.25	„	Bn.	m−1	7·3	
„ 7	95	14	„	Bo.	=n	7·5	
„ 8	96	25	„	Wd.	m−2, n+1	7·4	
„ 9	97	45	„	Br.	=n	7·5	
„ 9	97	40	„	La.	p−2, =q	8·2	Red.
„ 10	98	34	2	Cr.	=n	7·5	
„ 10	98	30	„	Ln.	n−1, p+4	7·6	
„ 10	98	40	1	Gi.	m−2, p+3	7·6	
„ 10	98	30	„	Gh.	=q	8·2	
„ 10	98	T.25	„	Bn.	o−4·5, q+1	8·1	
„ 10	98	14	„	Bo.	q−1, t+4	8·4	
„ 11	99	45	„	Bh.	m−1, n+1	7·4	
„ 11	9899	14	„	Bo.	n−3, p+3	7·7	
„ 13	9901	34	„	Cr.	=n	7·5	
„ 15	03	45	„	Bh.	=n, p+5	7·5	
„ 16	04	34	„	Cr.	n−1	7·6	
„ 16	04	30	2	Gh.	=q	8·2	
„ 17	05	45	1	Br.	m−1, n+1	7·4	
„ 18	06	40	2	La.	q−1	8·3	
„ 18	06	T.25	1	Bn.	o−0·5, q+5	7·7	
„ 19	07	45	„	Bh.	n−2, 7+4	7·6	
„ 20	08	40	„	La.	q−1, t+4, s+2	8·4	
„ 21	09	14	„	Bo.	q−1, t+4	8·4	
„ 21	09	40	„	La.	q−3, t+3	8·5	
„ 23	9911	25	„	Wd.	n−3, p+3	7·7	

(3493) R LEONIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
May 24	9912	14	I	Bo.	q−4, t+1	8·7	
,, 24	12	40	,,	La.	q−4, t+2	8·6	Red.
,, 25	13	45	,,	Br.	n−2, q+6	7·6	
,, 25	13	34	,,	Cr.	n−2	7·7	
,, 25	13	45	2	Bh.	m−5, n−2	7·7	
,, 25	13	T.50	I	Bn.	o−4, q+1	8·1	
,, 25	13	40	,,	Gi.	p−2, q+2·5	8·1	
,, 26	14	30	,,	Gh.	=13	9·0	
,, 26	14	14	2	Bo.	q−1, t+4	8·4	
,, 28	16	40	,,	La.	t+1, u+4	8·7	
,, 30	18	30	I	Gh.	=13	9·0	
,, 30	18	40	2	La.	=t, u+4	8·7	
,, 30	18	45	I	Bh.	=n, 7+3	7·5	
,, 30	18	T.50	,,	Bn.	q−3·5, s+1	8·6	
,, 31	19	40	,,	Gi.	p−1, q+1·5	8·1	
,, 31	19	t.22	,,	Bl.	n−6, q+1	8·1	
June 1	20	45	2	Bh.	m−3, n−1	7·6	
,, 1	20	30	I	Go.	q−3, t+3	8·5	
,, 2	21	24	,,	Bo.	p−2, q+0·5	8·2	
,, 2	21	34	,,	Cr.	n−4	7·9	
,, 5	24	40	,,	La.	t−2, =u	9·0	
,, 7	26	45	,,	Br.	n−4, q+3	7·9	
,, 7	26	,,	,,	Bh.	m−5, n−2	7·7	
,, 8	27	40	,,	La.	=t, u+3	8·8	
,, 8	27	,,	2	Gi.	q−2, t+3·5	8·5	
,, 12	31	60	,,	Go.	=u	9·0	
,, 14	33	40	I	La.	=t, u+2	8·8	
,, 14	33	45	2	Bh.	n−5	8·0	
,, 21	40	40	I	La.	t−2, u+1	9·0	
,, 24	43	25	,,	Wd.	u+2	8·8	
,, 28	47	,,	,,	,,	u+2	8·8	
July 6	55	60	,,	Go.	y−1·5, z+3	9·8	
,, 12	9961	25	2	Wd.	u−2	9·2	Difficult.
Sept. 6	0017	90	,,	Bh.	x−5, =23	10·2	
,, 24	35	T.94	,,	Bl.	=*a*	10·5	
,, 27	38	90	I	Bh.	y−8	10·4	
,, 30	41	T.94	,,	Bl.	=*a*	10·5	
Oct. 6	47	90	,,	Bh.	*a*+1	10·4	
,, 9	50	40	2	La.	z−4, =*a*	10·5	
,, 10	51	T.94	I	Bl.	=*a*	10·5	
,, 13	54	90	,,	Bh.	=z	10·1	
,, 16	57	150	,,	,,	y−4, =22, *a*+4	10·1	
,, 22	63	90	2	,,	y−5, 25+2	10·2	
,, 28	69	,,	I	,,	y−3, 23+2, *a*+4·5	10·0	
,, 28	69	T.94	,,	Bl.	y−3·5, *a*+4	10·0	
Nov. 5	77	90	,,	Bh.	19−4, y−2, 24+5	9·9	
,, 8	80	40	,,	La.	y−3, z+1	10·0	
,, 13	85	T.94	,,	Bl.	u−1, y+5	9·1	
,, 16	88	90	2	Bh.	w−3, y+2	9·4	
,, 22	94	t.22	I	Bl.	u−3, y+3	9·3	
,, 24	0096	90	,,	Bh.	t−2	9·1	

(3493) R LEONIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Nov. 28	0100	90	1	Bh.	=t	8·9	
„ 28	00	40	2	La.	u−6, =y	9·6	
Dec. 5	07	„	1	„	u−5, y+1	9·5	
„ 6	08	T.94	„	Bl.	=t, u+1	8·9	In t.22, 9·1.
„ 9	11	90	2	Bh.	t+5	8·4	
„ 11	13	40	1	La.	u−4, y+2	9·4	
„ 16	18	90	2	Bh.	=m, =n	7·4	
„ 18	20	t.22	1	Bl.	=q	8·2	
„ 23	25	45	2	Br.	n−5, u+10	8·0	Very difficult.
„ 25	27	40	1	La.	q−2, t+4, s+2	8·4	
„ 28	30	90	„	Bh.	m+2, n+4	7·1	
„ 30	32	45	„	„	k−3, m+3	6·9	
„ 31	33	24	„	Bo.	=m	7·2	
1914.							
Jan. 2	35	45	2	Br.	=m	7·2	Difficult.
„ 3	36	T.25	1	Bn.	o−3·5, q+2	8·0	
„ 5	38	t.22	2	Bl.	=k	6·6	
„ 6	39	45	„	Bh.	h−4, =k, n+6	6·8	
„ 6	39	25	1	Wd.	=h	6·4	
„ 11	44	45	2	Bh.	h−1, k+3	6·4	
„ 11	44	t.22	1	Bl.	f−5, h+1	6·3	
„ 11	44	24	2	Bo.	=h	6·4	
„ 14	47	45	1	Bh.	f−5, h+2	6·3	
„ 15	48	14	„	Bo.	f−6, h+1	6·4	
„ 18	51	24	2	„	=h	6·4	
„ 19	52	t.22	1	Bl.	f−3, h+3	6·1	In B. 6·5.
„ 20	53	„	„	„	h+2	6·2	By photometer.
„ 22	55	24	„	Bo.	f−6, h+0·5	6·4	
„ 23	56	45	„	Br.	f−4, h+2	6·2	
„ 23	56	20	„	La.	f−3, h+3	6·1	
„ 24	57	24	2	Bo.	f−5, h+1·5	6·3	
„ 25	58	90	1	Bh.	h+2, k+5	6·2	
„ 25	58	20	„	La.	=f, h+6	5·8	
„ 26	59	T.25	„	Bn.	f−4, h+1	6·3	
„ 27	60	t.22	„	Bl.	f−1, h+5	5·9	
„ 30	63	20	„	La.	d−5, f−1, h+5	5·9	
„ 31	64	24	2	Bo.	f−4, h+2	6·2	
Feb. 2	66	45	1	Bh.	h+2, k+4	6·2	
„ 2	66	40	„	Hw.	=h	6·4	
„ 2	66	25	„	Wd.	f−2, h+4	6·0	
„ 2	66	t.22	„	Bl.	f−2·5, h+3	6·1	By photometer 5·8.
„ 3	67	20	„	La.	f−3, h+3	6·1	
„ 3	67	40	„	Bc.	f−4, h+2	6·2	
„ 3	67	24	„	Bo.	f−1, h+4	6·0	
„ 4	68	T.50	„	Bn.	f−4, h+2	6·2	
„ 4	68	79	2	Ma.	h−1·5	6·6	Red.
„ 5	69	45	1	Br.	f−2, h+4	6·0	
„ 5	69	40	„	La.	f−2, h+4	6·0	
„ 7	71	25	„	Wd.	f−4, h+2	6·2	
„ 8	72	45	„	Bh.	=h, k+2	6·4	
„ 12	0176	15	„	Bo.	f−1, h+4	6·0	

(3493) R LEONIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Feb. 12	0176	40	1	Bc.	f−2, h+4	6·0	
„ 12	76	t.22	„	Bl.	h+2, k+6	6·1	By photometer.
„ 14	78	40	„	Bc.	=f	5·8	
„ 15	79	90	2	Bh.	h−2, =k	6·6	
„ 15	79	20	1	La.	f−3, h+3	6·1	
„ 17	81	25	„	Bo.	f−1, h+4	6·0	
„ 17	81	„	„	Wd.	f−4, h+2	6·2	
„ 18	82	45	„	Br.	f−3, h+3	6·1	
„ 18	82	T.50	„	Bn.	h+1	6·3	Very red.
„ 18	82	40	„	Hw.	=h	6·4	
„ 21	85	t.22	„	Bl.	f−4, h+1·5	6·3	
„ 22	86	T.50	„	Bn.	f−5, =h	6·4	Very red.
„ 22	86	45	2	Bh.	h+1, k+1	6·4	
„ 23	87	t.22	1	Bl.	f−4, h+1·5	6·3	By photometer 6·6.
„ 23	87	25	„	Bo.	f−4, h+1	6·3	
„ 25	89	„	„	Wd.	f−4, h+2	6·2	
„ 26	90	T.50	„	Bn.	h−1	6·5	
„ 26	90	40	„	Bc.	h−2, =k	6·6	
„ 28	92	25	2	Bo.	f−5, h+0·5	6·4	
„ 28	92	„	1	Wd.	f−4, h+2	6·2	
Mar. 1	93	45	„	Br.	h+1	6·3	
„ 1	93	„	„	Bh.	=h	6·4	
„ 1	93	50	„	Ma.	h−4, m+4	6·8	Red.
„ 2	94	t.22	„	Bl.	f−4, h+2	6·2	
„ 3	95	25	„	Wd.	f−4, h+2	6·2	
„ 5	97	75	„	La.	f−4, h+2	6·2	Orange.
„ 6	98	T.50	„	Bn.	=h, k+1	6·5	
„ 7	0199	25	„	Bo.	=h, k+1	6·5	
„ 9	0201	75	„	La.	f−4, h+1	6·3	
„ 11	03	40	„	Bc.	h−2, =k	6·6	
„ 11	03	45	„	Bh.	h−1, k+1	6·5	
„ 11	03	40	„	Hw.	f−8, h−2·5	6·7	
„ 16	08	45	„	Br.	h−1, k+1	6·5	
„ 16	08	75	„	La.	h−1, k+2	6·5	Orange red.
„ 16	08	T.50	„	Bn.	=h, k+1	6·5	
„ 17	09	t.22	„	Bl.	=h	6·4	
„ 20	12	60	2	Ga.	h−3	6·7	
„ 21	13	B.	„	„	=k, m+2	6·8	
„ 21	13	T.50	1	Bn.	=h, k+1	6·5	
„ 21	13	45	„	Bh.	h−0·5, k+1	6·5	
„ 22	14	60	2	Ga.	=m	7·2	
„ 26	18	40	1	Bc.	k−2, l+1, m+4	6·8	
„ 27	19	45	„	Br.	k−3, m+3	6·9	
„ 27	19	60	„	Ga.	m−1, n+1	7·4	
„ 27	19	T.50	„	Bn.	h−1, k+1	6·5	
„ 27	19	79	2	Ma.	h−5	6·9	
„ 27	19	t.22	1	Bl.	=h	6·4	
„ 28	20	25	„	Bo.	k−3, m+3	6·9	
„ 29	21	45	„	Bh.	k−3, m+3	6·9	
„ 30	22	B.	2	Ga.	m−1, n+1	7·4	
„ 30	22	25	1	Wd.	k−2, m+4	6·8	
„ 31	23	B.	2	Ga.	m−1, n+1	7·4	
„ 31	23	T.50	1	Bn.	h−1, =k	6·6	
„ 31	0223	20	„	La.	h−1·5, =k	6·6	

(3493) R LEONIS—*continued.*

Date.		Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.								
Apr.	2	0225	25	1	Wd.	k−2, m+4	6·8	
,,	3	26	t.22	,,	Bl.	k−1, m+5	6·7	
,,	4	27	60	,,	Ga.	n+1	7·4	
,,	4	27	40	,,	Bc.	m−2	7·4	
,,	4	27	,,	,,	La.	k−1, l+1, m+4	6·8	
,,	5	28	45	,,	Bh.	k−4, m+2	7·0	
,,	8	31	60	,,	Ga.	m−2, =n	7·5	
,,	10	33	,,	,,	,,	m−2, =n	7·5	
,,	10	33	40	,,	La.	k−4, m+2	7·0	
,,	12	35	25	2	Bo.	m−1, n+1	7·4	
,,	12	35	40	1	Bc.	m−2	7·4	
,,	12	35	25	,,	Wd.	=m	7·2	
,,	12	35	t.22	,,	Bl.	k−5, m+1	7·1	
,,	14	37	20	2	La.	k−4, =m	7·1	
,,	15	38	45	1	Br.	n−1	7·6	
,,	15	38	,,	,,	Bh.	=m, n+3	7·2	
,,	16	39	60	,,	Ga.	n−3, 7+2	7·7	
,,	18	41	25	,,	Bo.	m−1, n+1	7·4	
,,	18	41	30	,,	Gh.	n−6, =q, u+9	8·1	
,,	18	41	40	,,	Bc.	p+4	7·6	
,,	19	42	60	,,	Ga.	n−4, p−1, 7+1	7·9	
,,	20	43	34	,,	Cr.	m−1, n+1	7·4	
,,	21	44	60	,,	Ga.	n−4, =7, =p	7·9	
,,	22	45	20	,,	La.	k−4, m−1, n+1, p+4	7·3	
,,	25	48	30	,,	Gh.	n−7, =q, u+7	8·2	
,,	25	48	34	,,	Cr.	m−1, n+1	7·4	
,,	25	48	25	,,	Bo.	=n	7·5	
,,	25	48	T.50	,,	Bn.	k−4, m+1	7·1	
,,	26	49	60	,,	Ga.	7−3, p−1, q+1	8·1	
,,	26	49	45	,,	Br.	n−2, q+5	7·7	
,,	26	49	,,	,,	Bh.	m−1, n+1	7·4	
,,	27	50	t.22	2	Bl.	m−2, q+8	7·4	
,,	27	50	20	,,	La.	m−4, n−2, p+2	7·7	
,,	28	51	60	1	Ga.	p−1, q+2	8·1	
,,	28	51	34	,,	Cr.	n−1	7·6	
,,	28	51	t.30	,,	Bn.	k−5, m+1	7·1	
,,	30	53	45	,,	Bh.	m−1, n+1	7·4	
May	2	55	34	2	Cr.	n−3	7·8	
,,	2	55	60	,,	Ga.	p−3, =q	8·3	
,,	2	55	25	1	Bo.	n−1, p+4	7·6	
,,	2	55	45	,,	Bh.	m−2, n+1	7·4	
,,	2	55	t.22	2	Bl.	m−5, q+5	7·7	
,,	5	58	60	,,	Ga.	p−2, =q	8·2	
,,	8	61	25	,,	Bo.	n−1, p+4	7·6	
,,	10	63	45	,,	Bh.	m−1, n+1	7·4	
,,	11	64	60	,,	Ga.	=t, 13+2, u+3	8·8	
,,	12	65	t.22	,,	Bl.	q−3, t+3	8·5	
,,	14	67	90	1	Bh.	=p	8·0	
,,	14	67	25	,,	Wd.	=q	8·2	
,,	15	68	30	,,	Gh.	t−1, 13+1	8·9	
,,	15	68	T.50	,,	Bn.	q−2, s+2	8·5	
,,	16	69	34	2	Cr.	=q	8·2	
,,	16	69	45	1	Br.	q−4, u+4	8·6	
,,	16	0269	,,	,,	Bh.	n−6, p−1, q+1, s+6	8·1	

(3493) R LEONIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
May 16	0269	t.22	1	Bl.	q−1, t+5	8·3	
„ 17	70	60	2	Ga.	q−3, t+3	8·5	
„ 18	71	40	„	Hw.	n−7, u+7	8·2	
„ 20	73	T.50	1	Bn.	q−4, s+0·5	8·6	
„ 20	73	25	„	Wd.	=q	8·2	
„ 21	74	„	„	Bo.	p−1, =q	8·2	
„ 21	74	30	„	Gh.	=13	9·0	
„ 21	74	40	„	La.	t+1, u+3	8·7	
„ 25	78	60	„	Ga.	13+1, u+2	8·8	
„ 25	78	T.50	„	Bn.	q−4, s+0·5	8·6	
„ 28	81	25	„	Bo.	p−2, q+0·5	8·2	
„ 28	81	40	„	La.	t−1, u+0·5	8·9	
„ 30	83	t.22	2	Bl.	=t	8·9	
June 5	89	25	„	Wd.	=t	8·9	
„ 9	93	40	„	La.	u−4, y+3	9·4	
„ 10	94	45	„	Bh.	n−6, =q, u+9	8·1	
„ 14	98	40	1	La.	u−4, y+2	9·4	
„ 15	0299	45	2	Bh.	p−3, =q	8·3	
„ 22	0306	40	„	La.	u−5, =y	9·6	
„ 27	11	25	1	Wd.	u−2, y+4	9·2	
July 4	18	40	2	Bc.	z−3, =*a*	10·4	Doubtful.
„ 17	31	25	„	Wd.	y−2	9·8	About; doubtful.
Sept. 1	77	45	„	Bh.	u−3·5	9·3	
„ 19	95	„	1	„	u−3	9·3	
„ 22	0398	90	„	„	u−3	9·3	
„ 24	0400	„	„	Bh.	u−1	9·1	
„ 24	00	40	„	La.	y+1, z+5	9·6	
Oct. 13	19	„	„	„	u−1, y+4·5	9·1	
„ 18	24	90	„	Bh.	=u	9·0	
„ 21	27	„	2	„	=t, 13+1, u+1	8·9	
„ 27	33	„	1	„	u+2	8·8	
Nov. 3	40	„	2	„	n−6, =q, s+6	8·1	
„ 5	42	T.94	„	Bl.	n−2, q+5	7·7	
„ 10	47	45	1	Bh.	m−4, n−1, p+4	7·6	
„ 15	52	90	„	„	m−2, =n, p+6	7·4	
„ 17	54	t.22	„	Bl.	k−1, m+5	6·7	
„ 18	55	20	„	La.	p−2, =q, s+5	8·2	
„ 21	58	t.22	„	Bl.	h−1, k+1	6·5	
„ 22	59	45	„	Bh.	h−1, k+1	6·5	
„ 23	60	„	2	Br.	k−3, m+3	6·9	
„ 26	63	90	1	Bh.	=h	6·4	
„ 28	65	20	„	La.	f−5, h+1, k+3	6·3	
Dec. 3	70	t.22	„	Bl.	f−3, h+3	6·1	
„ 10	77	45	„	Bh.	f−4, h+2	6·2	
„ 14	81	60	„	Br.	f−2, h+4	6·0	
„ 15	82	20	„	La.	f−2, h+4	6·0	
„ 19	86	45	„	Bh.	f−4, h+2	6·2	Orange red.
„ 20	0487	t.22	2	Bl.	f−2, h+4	6·0	

(3493) R LEONIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Dec. 21	0488	45	2	Bh.	f−3, h+3	6·1	Orange.
„ 22	89	t.22	1	Bl.	f−3, h+3	6·1	
„ 23	90	45	„	Bh.	f−4, h+2	6·2	
„ 24	91	t.22	„	Bl.	f−4, h+2·5	6·2	
„ 29	0496	45	„	Bh.	f−1, h+4	6·0	

(3825) R URSÆ MAJORIS. (V. 1.)

H.D. 103769.

NOTES.

Star D = D.M. + 69° 576, 8·33 m. estimated.

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Jan. 10	8682	T.94	1	Ni.	20−2, 23+0·5	12·5	
„ 21	93	„	„	„	=17	11·8	
„ 26	8698	T.150	„	Bn.	14−7·5, 18−2	12·2	
„ 30	8702	T.120	„	„	14−3·5, 18+2	11·8	
„ 30	02	T.94	„	Ni.	17−1	11·9	
Feb. 2	05	183	2	Ma.	14−2, 18+4	11·7	
„ 4	07	T.120	1	Bn.	14−3, 18+2	11·8	
„ 9	12	T.167	„	„	14−1·5, 18+4	11·6	
„ 9	12	T.94	„	Ni.	14−2, 17+1·5	11·7	
„ 11	14	T.120	„	Bn.	13−4, 14+1	11·4	
„ 15	18	T.95	„	„	13−2, 14+2	11·3	
„ 18	21	T.94	„	Ni.	12−3, 14+5	11·0	
„ 27	30	„	„	„	l−7, 7+3	9·5	
„ 28	31	50	„	Ma.	5−2·5	8·4	
Mar. 3	34	„	„	„	5−5, 7+10	8·7	
„ 5	36	t.22	„	Ni.	5−10, 7+5	9·2	
„ 13	44	„	„	„	5−3, l+3·5	8·5	
„ 13	44	50	2	Ma.	=5	8·2	
„ 16	47	T.25	1	Bn.	3−1·5, 4+1	7·9	
„ 19	50	50	2	Ma.	5+2, =D	8·2	
„ 20	51	t.22	1	Ni.	3−3, 5+2	8·0	
„ 25	56	50	2	Ma.	5+1	8·1	
„ 27	58	t.30	1	Bn.	3+1	7·6	
„ 29	60	T.25	„	„	=3	7·7	
„ 30	61	t.22	„	Ni.	3+2	7·5	Yellow.
Apr. 1	63	t.30	„	Bn.	3+2	7·5	
„ 2	64	„	„	„	3+2·5, 4+5	7·5	
„ 7	8769	„	2	„	3−1·5, 4+1	7·9	

(3825) R URSÆ MAJORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Apr. 10	8772	t.30	1	Bn.	3−2, 4+0·5	7·9	
„ 11	73	t.22	„	Ni.	=3	7·7	Yellow.
„ 15	77	t.30	„	Bn.	4−0·5	8·0	
„ 17	79	„	2	„	4−0·5, 5+2	8·0	
„ 24	86	t.22	1	Ni.	=5	8·2	Orange yellow.
May 3	95	„	„	„	5−2, l+4	8·4	
„ 6	98	T.50	2	Bn.	5−2	8·4	
„ 7	99	t.30	1	„	5−1·5	8·3	
„ 7	8799	50	„	Ma.	5+2	8·0	
„ 12	8804	t.22	„	Ni.	l+0·5	8·8	
„ 12	04	t.60	„	Bn.	5−3	8·5	
„ 15	07	t.30	„	„	5−8·5, m+4	9·0	
„ 16	08	50	„	Ma.	5−8, 7+8	9·0	
„ 22	14	t.30	„	Bn.	m+2·5	9·2	
„ 23	15	t.22	„	Ni.	l−6, 7+4	9·4	
June 3	26	T.50	„	Bn.	m−2, 7+1·5	9·6	
„ 5	28	t.22	„	Ni.	=7	9·8	
„ 13	36	79	„	Ma.	7−3, 12+6	10·1	
„ 14	37	T.70	„	Bn.	10+1·5	10·3	
„ 17	40	79	„	Ma.	7−8, 12+2	10·5	
„ 19	42	T.95	„	Bn.	10−1·5, 12+1	10·6	
„ 24	47	79	„	Ma.	12−1	10·8	
July 1	54	T.94	„	Ni.	12−4, 14+4	11·1	
„ 11	64	„	„	„	=14	11·5	
„ 11	64	T.120	„	Bn.	14−1, 18+4·5	11·6	
„ 11	64	183	2	Ma.	14+2	11·3	
„ 22	75	„	„	„	14−4, 18+1	11·9	Very difficult.
„ 23	76	T.150	1	Bn.	14−3·5, 18+2	11·8	
„ 25	78	183	„	Ma.	14−3·5, 18+2	11·8	
„ 27	80	T.94	„	Ni.	=20	12·3	
Aug. 2	86	183	„	Ma.	18−1	12·1	
„ 7	91	„	„	„	18−3, 23−1	12·5	
„ 9	93	T.94	„	Ni.	20−2, 23+0·5	12·5	
„ 10	94	183	„	Ma.	18−2, 23+2	12·3	
„ 12	96	„	„	„	18−1, =23	12·3	
„ 15	8899	„	„	„	18−2, 23+2	12·3	
„ 26	8910	„	2	„	18−3	12·3	Very difficult.
„ 29	13	T.94	1	Ni.	23−4, 27+1	13·0	
Sept. 21	36	„	2	„	27−2	13·3	
„ 25	40	„	„	„	=w	13·5	
„ 27	42	T.150	1	Bn.	<29	<13·1	Invisible.
Oct. 6	51	T.94	„	Ni.	27−3, w+1·5	13·4	
„ 14	59	„	„	„	=w	13·5	
„ 23	68	„	2	„	27−2, w+1	13·4	
Nov. 2	78	„	1	„	27−2, w+2	13·3	
„ 11	87	„	„	„	=27	13·1	
„ 22	98	T.200	„	Bn.	18−4, 23+1	12·4	
„ 23	8999	T.94	„	Ni.	20−2, 23+0·5	12·5	

(3825) R URSÆ MAJORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Dec. 4	9010	T.94	2	Ni.	=20	12·3	
„ 13	19	„	1	„	14+1	11·4	
„ 22	28	T.50	„	Bn.	9−1, =10	10·4	
„ 24	30	t.60	„	„	9−1, =10	10·4	
„ 26	32	t.22	„	Ni.	=7	9·8	
„ 27	33	t.60	„	Bn.	7−3, 9+2	10·1	
„ 29	35	„	„	„	7−1, 9+4	9·9	
„ 30	36	„	„	„	7+2	9·6	
1911.							
Jan. 1	38	„	„	„	7+1·5	9·6	
„ 6	43	t.30	„	„	m+3	9·1	
„ 9	46	„	„	„	5−9·5, m+3	9·1	
„ 9	46	t.22	„	Ni.	l−2, 7+8	9·0	
„ 15	52	t.30	„	Bn.	5−7·5, m+5	8·9	
„ 28	65	„	„	„	4−1, =5	8·1	
„ 29	66	t.22	„	Ni.	5−2, l+4	8·4	Yellowish white.
„ 31	68	t.30	„	Bn.	4−1, =5	8·1	
Feb. 8	76	t.22	„	Ni.	5+1	8·1	Yellowish white.
„ 19	87	t.30	„	Bn.	3−1·5, 4+1	7·9	
„ 22	90	t.22	„	Ni.	3−3, 5+2	8·0	Yellowish white.
„ 25	93	T.25	„	Bn.	4−0·5, 5+2	8·0	
Mar. 2	9098	„	„	„	4−0·5, 5+2	8·0	
„ 5	9101	t.22	„	Ni.	5−1	8·3	Yellowish white.
„ 7	03	t.30	„	Bn.	4−1·5, 5+1	8·1	
„ 9	05	T.25	„	„	4−1, =5	8·1	
„ 19	15	t.22	„	Ni.	5−5, l+1	8·7	
„ 21	17	T.50	„	Bn.	5−12, 7+4	9·4	
„ 31	27	„	„	„	7+2·5	9·5	
„ 31	27	t.22	„	Ni.	l−7, 7+2	9·5	
Apr. 3	30	T.50	„	Bn.	7+2	9·6	
„ 6	33	t.22	„	Ni.	=7	9·8	
„ 15	42	t.60	2	Bn.	7+1	9·7	
„ 17	44	t.22	1	Ni.	7−6, 10+1·5	10·3	
„ 19	46	t.60	2	Bn.	7−3·5, 9+1	10·1	
„ 20	47	„	1	„	9−3, 12+2	10·5	
„ 24	51	t.75	„	„	10−1·5, 12+1	10·6	
„ 26	53	„	„	„	10−1, =12	10·6	
„ 26	53	T.94	„	Ni.	10−1·5, 12+1	10·6	In t.22, 10·7.
May 4	61	T.95	„	Bn.	10−4·5, 13+1	10·9	
„ 6	63	T.94	„	Ni.	12−4, 14+4	11·1	
„ 15	72	„	„	„	12−5, 14+2·5	11·2	
„ 22	79	T.120	„	Bn.	14−3·5, 18+2	11·8	
„ 24	81	„	„	„	14−4·5, 18+1	11·9	
„ 25	82	T.94	„	Ni.	14−1·5, 17+2	11·6	
June 5	93	„	„	„	17−2, 20+2	12·0	
„ 6	9194	T.120	„	Bn.	18−1	12·1	
„ 18	9206	T.94	„	Ni.	20−2, 23+1	12·4	

(3825) R URSÆ MAJORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
July 2	9220	T.94	1	Ni.	20−2, 23+1	12·4	
,, 11	29	60	,,	Cr.	<14	<11·5	
,, 19	37	T.94	,,	Ni.	=23	12·5	
,, 22	40	T.200	,,	Bn.	23−1, 29+4	12·7	
,, 27	45	T.167	,,	,,	23−2, 29+4	12·7	
,, 30	48	T.94	,,	Ni.	23−2, 27+3	12·8	
Aug. 1	50	T.167	,,	Bn.	23−2, 29+4	12·7	
,, 13	62	T.94	,,	Ni.	23+1·5	12·4	
,, 24	9273	,,	,,	,,	20−0·5, 23+2	12·3	
Sept. 22	9302	,,	,,	,,	12−5·5, 14+2	11·3	
,, 27	07	,,	,,	,,	12−5, 14+3	11·2	
Oct. 1	11	T.95	,,	Bn.	10−5, 13+0·5	11·0	
,, 8	18	T.94	,,	Ni.	10−2, 12+0·5	10·7	
,, 12	22	35	3	La.	7−2	10·0	
,, 16	26	t.22	1	Ni.	=7	9·8	
,, 21	31	35	2	La.	5−2	8·4	
,, 21	31	T.50	1	Bn.	5−4, m+8·5	8·6	
,, 25	35	T.25	,,	,,	3−1·5, 4+1	7·9	
,, 26	36	t.30	,,	,,	3−2, 4+0·5	7·9	
,, 26	36	t.22	,,	Ni.	3−2, 5+2	7·9	Yellowish white.
,, 26	36	35	,,	La.	5−1	8·3	
,, 28	38	t.30	,,	Bn.	3−1·5, 4+1	7·9	
,, 30	40	,,	,,	,,	3−1·5, 4+1	7·9	
Nov. 3	44	25	,,	La.	3+1	7·6	
,, 5	46	T.25	,,	Bn.	3−1, 4+1·5	7·8	
,, 5	46	t.22	2	Ni.	d−7, 3+3	7·4	
,, 12	53	t.30	1	Bn.	3−1, 4+1·5	7·8	
,, 15	56	T.25	,,	,,	3+1	7·6	
,, 21	62	,,	,,	,,	3+2	7·5	
,, 21	62	t.22	2	Ni.	d−4, 3+6	7·1	Yellowish white.
,, 25	66	T.25	1	Bn.	3+2·5, 4+5	7·5	
,, 29	70	,,	,,	,,	3+5, 4+7	7·2	
Dec. 4	75	t.22	2	Ni.	d−7, 3+3	7·4	
,, 5	76	T.25	1	Bn.	3+0·5	7·7	
,, 7	78	,,	,,	,,	3+1	7·6	
,, 11	82	,,	2	,,	3−1, 4+1·5	7·8	
,, 11	82	t.22	1	Ni.	3+2	7·5	
,, 17	88	25	,,	La.	=3	7·7	
,, 19	90	,,	2	,,	3−2, 5+3	7·9	
,, 20	91	T.25	1	Bn.	3−1, 4+1	7·8	
,, 22	93	25	,,	La.	3−1, 5+4	7·8	
,, 24	95	t.22	,,	Ni.	3−2, 5+2	7·9	
,, 25	96	p.26	,,	Bn.	3−2, 4+0·5	7·9	p=2″ O.G.
,, 26	97	25	,,	La.	3−2, 5+3	7·9	
,, 27	9398	,,	2	,,	3−3, 5+2	8·0	
,, 30	9401	t.22	1	Ni.	3−4, 5+1	8·1	
1912.							
Jan. 7	09	,,	,,	,,	5−2·5, 1+4	8·4	Yellowish white.
,, 7	9409	40	,,	La.	5−4, 7+12	8·6	

(3825) R URSÆ MAJORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Jan. 8	9410	40	1	La.	5−1	8·3	
,, 10	12	,,	2	,,	5−5	8·7	
,, 14	16	t.22	1	Ni.	5−4·5, l+2	8·6	
,, 26	28	,,	,,	,,	l−6, 7+4	9·4	
,, 26	28	T.50	,,	Bn.	5−9, m+3·5	9·1	
Feb. 4	37	t.22	2	Ni.	7−1	9·9	
,, 11	44	,,	1	,,	7+1	9·7	
,, 12	45	40	2	La.	7−1	9·9	
,, 15	48	,,	1	,,	=9	10·2	
,, 17	50	,,	,,	,,	10−2, 12+1	10·6	
,, 20	53	,,	2	,,	7−8, 12+2	10·5	
,, 22	55	,,	,,	,,	12−2·5, 14+5	11·0	
,, 25	58	T.94	,,	Ni.	12+2	10·5	In t.22, 10·8.
,, 28	61	40	1	La.	13+2	10·8	
Mar. 3	65	T.94	,,	Ni.	12−4, 14+4	11·1	
,, 5	67	40	2	La.	13−1·5, 14+3	11·2	
,, 8	70	,,	1	,,	13−3, 14+1·5	11·3	
,, 11	73	,,	2	,,	13−3, 14+1·5	11·3	
,, 14	76	,,	1	,,	13−4, 14+1	11·4	
,, 18	80	,,	2	,,	14−1	11·6	
,, 19	81	T.94	1	Ni.	14−1, 17+2·5	11·6	
,, 23	85	40	2	La.	14−2, 17+2	11·7	
Apr. 3	9496	T.94	1	Ni.	17−0·5	11·9	
,, 8	9501	40	,,	La.	18−1	12·1	
,, 11	04	T.94	,,	Ni.	=23	12·5	
,, 22	15	,,	,,	,,	20−2, 23+1	12·4	
,, 23	16	38	2	Gd.	=23	12·5	
May 3	26	T.94	1	Ni.	=23	12·5	
,, 13	36	,,	,,	,,	23−4·5, 27+1	13·0	
,, 17	40	T.167	,,	Bn.	23−1	12·6	
June 2	56	T.200	,,	,,	29−1	13·2	
,, 5	59	T.94	,,	Ni.	=27	13·1	
,, 18	72	,,	,,	,,	23−4, 27+1	13·0	
,, 21	75	T.167	,,	Bn.	29−2	13·3	
July 5	89	T.94	2	Ni.	23+0·5	12·5	
,, 11	95	T.120	,,	Bn.	18−3, 23+1·5	12·4	
,, 12	96	T.94	,,	Ni.	20−1, 23+1·5	12·4	
,, 14	9598	T.120	1	Bn.	18−3, 23+1·5	12·4	
,, 24	9608	T.94	2	Ni.	14−2, 17+1·5	11·7	
,, 27	11	,,	1	,,	12−6·5 ,14+1	11·4	
Aug. 2	17	90	2	Bh.	12−4, =13, 14+4	11·1	
,, 8	23	T.94	1	Ni.	12−3, 14+5	11·0	
,, 12	27	90	2	Bh.	7−3, 10+3	10·1	
,, 18	33	40	1	La.	7+2	9·6	
,, 19	34	,,	,,	,,	=m	9·4	
,, 19	34	T.94	,,	Ni.	7−1, 10+6	9·9	In t.22, 9·7.
,, 19	34	45	2	Bh.	=7	9·8	Red.
,, 24	39	40	1	La.	5−8, m+4	9·0	
,, 26	9641	,,	,,	,,	5−6, m+6	8·8	

(3825) R URSÆ MAJORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Aug. 27	9642	45	2	Bh.	5−8, 7+8	9·0	Red.
„ 28	43	40	„	La.	5−5	8·7	
„ 30	45	45	1	Bh.	=5	8·2	Red.
„ 30	45	T.50	„	Bn.	5−7·5, m+5	8·9	
Sept. 1	47	40	2	La.	5−3	8·5	
„ 2	48	t.60	1	Bn.	5−2, m+10·5	8·4	
„ 2	48	45	„	Bh.	4−1, 5+1	8·1	
„ 3	49	40	2	La.	=5	8·2	
„ 4	50	T.94	1	Ni.	=5	8·2	
„ 5	51	45	2	Bh.	=4	8·0	
„ 7	53	20	1	La.	3+1	7·6	
„ 10	56	45	2	Bh.	=4	8·0	
„ 13	59	20	1	La.	=3	7·7	
„ 14	60	„	„	„	3+1	7·6	
„ 14	60	T.94	„	Ni.	3−0·5	7·8	Yellowish white.
„ 15	61	20	„	La.	3−1, 5+4	7·8	
„ 17	63	45	2	Bh.	=3, =4	7·8	
„ 17	63	T.50	1	Bn.	4−2, 5+1	8·1	
„ 18	64	20	„	La.	3−1, 5+4	7·8	
„ 19	65	T.94	2	Ni.	3−2, 5+3	7·9	
„ 20	66	T.50	1	Bn.	=4	8·0	
„ 21	67	20	„	La.	=3	7·7	
„ 22	68	45	„	Bh.	3−1, 4+1	7·8	
„ 22	68	T.50	„	Bn.	3−2, 4+0·5	7·9	
„ 24	70	20	„	La.	3−2, 5+3	7·9	
„ 27	73	„	„	„	3−3, 5+2	8·0	
„ 27	73	45	2	Bh.	=3	7·7	
Oct. 2	78	„	1	„	=3	7·7	
„ 2	78	20	„	La.	3−3, 5+2	8·0	
„ 2	78	T.94	„	Ni.	5−0·5	8·2	
„ 2	78	T.50	„	Bn.	3−2, 4+0·5	7·9	
„ 4	80	„	„	„	3−2, 4+0·5	7·9	
„ 4	80	45	2	Bh.	=3	7·7	
„ 5	81	T.50	1	Bn.	4+1	7·9	
„ 7	83	45	„	Bh.	4−1, 5+1	8·1	
„ 8	84	T.94	„	Ni.	=5	8·2	
„ 9	85	T.50	„	Bn.	5−2	8·4	
„ 11	87	40	„	La.	=5	8·2	
„ 13	89	20	„	„	5−1·5, l+4	8·4	
„ 14	90	T.50	„	Bn.	4−2, 5+0·5	8·1	
„ 15	91	20	„	La.	5−1	8·3	
„ 17	93	„	„	„	5−2	8·4	
„ 17	93	T.94	„	Ni.	5−1	8·3	
„ 17	93	45	2	Bh.	=5	8·2	
„ 17	93	T.50	1	Bn.	5−1	8·3	
„ 20	96	20	„	La.	5−2, l+4	8·4	
„ 22	9698	45	„	Bh.	5−2	8·4	
„ 26	9702	40	„	La.	5−3	8·5	
„ 31	07	T.94	„	Ni.	l+0·5	8·8	
Nov. 1	08	T.50	2	Bn.	5−9·5, m+3	9·1	
„ 4	11	20	„	La.	=k	8·9	
„ 8	15	„	1	„	m+2	9·2	
„ 11	9718	45	2	Bh.	7+3	9·5	

(3825) R URSÆ MAJORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Nov. 12	9719	20	I	La.	=m	9·4	
„ 13	20	40	„	„	m+1, 7+3	9·4	
„ 17	24	45	„	Bh.	=7, 6+2	9·7	
„ 20	27	T.94	„	Ni.	7−5, 10+2	10·3	
„ 25	32	45	2	Bh.	9−2, =10, 11+2	10·4	
„ 27	34	T.95	I	Bn.	7−5·5, 10+1	10·3	
„ 29	36	45	„	Bh.	10−3, =11, =12, 13+3	10·7	
„ 30	37	T.95	„	Bn.	10−3, 13+3	10·7	
Dec. 3	40	40	„	La.	12−1	10·8	
„ 4	41	T.94	2	Ni.	=12	10·7	
„ 6	43	45	I	Bh.	11−2, 12−4, 13+2, 14+4	11·0	
„ 7	44	40	„	La.	12−2, 13+2	10·9	
„ 10	47	45	„	Bh.	12−4, =13, 14+4	11·1	
„ 11	48	40	„	La.	12−2, 13+1	10·9	
„ 12	49	T.94	„	Ni.	12−6, 14+2	11·3	
„ 12	49	T.95	„	Bn.	10−4·5, 13+1	10·9	
„ 16	53	50	„	Ma.	14+1	11·4	
„ 16	53	90	„	Bh.	14−3, 17+1, 18+3	11·7	
„ 21	58	T.94	„	Ni.	12−6, 14+2	11·3	
„ 23	60	150	2	Bh.	14−3, 18+3	11·8	
„ 28	65	90	„	„	=17, =18, =20	12·0	
„ 29	66	T.94	I	Ni.	12−7, 14+0·5	11·4	
„ 29	66	T.120	„	Bn.	14−3·5, 18+2	11·8	
„ 31	68	90	„	Bh.	18−1, 20+1	12·1	
1913.							
Jan. 5	73	„	„	„	17−2, =18, =19, 20+2	12·1	
„ 5	73	T.120	„	Bn.	14−4, 18+1·5	11·9	
„ 8	76	T.94	„	Ni.	17−2·5, 20+2	12·1	
„ 12	80	90	„	Bh.	18−2, =20, 23+2	12·3	
„ 12	80	40	2	La.	14−3	11·8	
„ 15	83	T.94	I	Ni.	17−1	11·9	
„ 18	86	90	2	Bh.	=20	12·3	
„ 25	93	150	I	„	20−3, =23, 26+3	12·5	
„ 26	94	T.120	„	Bn.	18−3·5, 23+2	12·4	
„ 31	99	90	„	Bh.	23−2, 26+2	12·7	
„ 31	9799	T.94	„	Ni.	=23	12·5	
Feb. 8	9807	90	„	Bh.	=26	12·8	
„ 8	07	T.94	„	Ni.	23−1·5, 27+4	12·7	
„ 22	21	„	„	„	27−1	13·2	
„ 27	26	90	2	Bh.	=26, =27, =28	13·0	
Mar. 3	30	„	I	„	26−1, =27	13·0	
„ 6	33	„	„	„	=27, 28−1, =29	13·1	
„ 8	35	T.94	„	Ni.	27−2	13·3	
„ 8	35	T.150	„	Bn.	29−3	13·4	
„ 11	38	90	„	Bh.	26−1, =27	13·0	
„ 15	42	„	2	„	=26, =27, =28	13·0	
„ 23	50	T.94	I	Ni.	27−1	13·2	
„ 25	9852	150	„	Bh.	=26, =27, =28	13·0	

(3825) R URSÆ MAJORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Mar. 27	9854	90	1	Bh.	26−1, =27, =29	13·1	
„ 30	57	„	„	„	=28, =30	13·1	
„ 30	57	T.167	„	Bn.	29−3	13·4	
Apr. 4	62	90	2	Bh.	=27, =28	13·1	
„ 7	65	T.94	1	Ni.	=27	13·1	
„ 22	80	„	2	„	23−1, 27+4	12·7	
„ 25	83	90	„	Bh.	=23	12·5	
„ 28	86	„	1	„	18−2, =20, 23+2	12·3	
„ 28	86	T.94	„	Ni.	=23	12·5	
May 1	89	T.167	„	Bn.	23−4, 29+2	12·9	
„ 2	90	90	„	Bh.	17−5, 18−2, =20	12·3	
„ 2	90	183	„	Ma.	23−1	12·6	
„ 4	92	90	„	Bh.	17−2, =18, 20+2	12·0	
„ 6	94	T.120	„	Bn.	23−2, 29+3	12·8	
„ 9	97	183	„	Ma.	18−3, 23+1	12·4	
„ 10	98	T.150	„	Bn.	18−1, 23+3	12·2	
„ 11	99	90	„	Bh.	17−1, 18+1, 20+3	11·9	
„ 11	9899	T.94	„	Ni.	17−4, 23+2·5	12·3	
„ 13	9901	T.120	„	Bn.	14−4·5, 18+1	11·9	
„ 13	01	183	„	Ma.	=18	12·0	
„ 15	03	T.94	„	Ni.	14−3, 17+1	11·8	
„ 16	04	183	„	Ma.	14−4, 18+1	11·9	
„ 17	05	90	„	Bh.	14−3·5, 18+2	11·8	
„ 22	10	40	„	La.	=14	11·5	
„ 22	10	T.94	„	Ni.	12−6, 14+2	11·3	
„ 23	11	183	„	Ma.	14+2, 18+4	11·5	
„ 23	11	T.95	2	Bn.	14+1	11·4	
„ 24	12	79	1	Ma.	10−3, 13+3	10·7	
„ 24	12	40	„	La.	14+1	11·4	
„ 25	13	T.95	„	Bn.	13−2, 14+2	11·3	
„ 25	13	45	„	Bh.	14+2	11·3	
„ 26	14	40	2	La.	12−7, 14+1	11·4	
„ 28	16	„	1	„	12−5, 14+2	11·2	
„ 28	16	T.94	„	Ni.	12−4, 14+4	11·1	
„ 30	18	T.50	„	Bn.	9−1, =10	10·4	
„ 30	18	45	„	Bh.	10−5, 14+5	11·0	
„ 31	19	79	„	Ma.	7−8, 12+1·5	10·6	
„ 31	19	25	„	Bo.	9−1, 10+1	10·4	
June 1	20	40	2	La.	=6, 7−1	9·9	
„ 2	21	45	„	Bh.	=10, 12+1	10·5	
„ 2	21	t.85	1	Bn.	8−1, 9+1	10·2	
„ 3	22	79	„	Ma.	5−14, 7+2	9·6	
„ 3	22	40	„	La.	m−3, 7+1	9·7	
„ 3	22	34	2	Cr.	7+2	9·6	
„ 4	23	45	1	Bh.	7−6, 10+1, 12+3	10·4	
„ 4	23	25	„	Bo.	=7	9·8	
„ 4	23	T.50	„	Bn.	8+1	10·0	
„ 7	26	45	„	Bh.	5−12, 7+4	9·4	
„ 7	26	34	„	Cr.	=7	9·8	
„ 8	27	40	„	La.	k−3, 7+6	9·2	
„ 9	28	„	2	„	=l, m+5	8·9	
„ 12	31	20	1	„	5−4, l+2	8·6	
„ 14	9933	t.22	„	Ni.	=l	8·8	

(3825) R URSÆ MAJORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
June 14	9933	45	1	Bh.	5−4, 7+12	8·6	
,, 14	33	25	,,	Bo.	=5	8·2	
,, 15	34	34	2	Cr.	5−5	8·7	
,, 16	35	79	1	Ma.	=5	8·2	
,, 17	36	34	2	Cr.	5−1	8·3	
,, 17	36	45	1	Bh.	5−3	8·5	
,, 19	38	25	,,	Bo.	=5	8·2	
,, 21	40	40	2	La.	3−4, =5	8·1	
,, 23	42	T.50	1	Bn.	4−1·5, 5+1	8·1	
,, 27	46	t.60	,,	,,	4−1	8·1	
,, 27	46	50	,,	Ma.	5+2	8·0	
,, 29	48	34	2	Cr.	5+2	8·0	
,, 30	49	45	,,	Bh.	5+1	8·1	
,, 30	49	25	1	Bo.	4−2, 5+0·5	8·1	
July 3	52	t.60	,,	Bn.	4−1·5, 5+1	8·1	
,, 7	56	45	2	Bh.	5+2	8·0	
,, 10	59	t.22	1	Ni.	3−2, 5+2	7·9	
,, 11	60	t.30	,,	Bn.	3−1·5, 4+1	7·9	
,, 11	60	45	,,	Bh.	5+5	7·7	
,, 13	62	50	2	Ma.	3−2, D+4	7·9	
,, 16	65	t.22	1	Ni.	3−1·5, 5+3	7·9	
,, 19	68	45	,,	Bh.	=3, 4−2, 5+0·5	8·0	
,, 20	69	T.25	,,	Bn.	3−2, 4+0·5	7·9	
,, 23	72	50	2	Ma.	=4	8·0	
,, 24	73	15	,,	Bo.	=3	7·7	
,, 25	74	45	1	Bh.	3−1, 5+2	7·9	
,, 29	78	T.50	,,	Bn.	=4, 5+1	8·0	
,, 30	79	45	2	Bh.	=4, 5+2	8·0	
Aug. 1	81	50	,,	Ma.	4−2, D+2	8·1	
,, 2	82	45	1	Bh.	5+2	8·0	
,, 2	82	34	2	Cr.	5+4	7·8	
,, 3	83	50	1	Ma.	5+4	7·8	
,, 9	89	45	2	Bh.	4−1, 5+3	8·0	
,, 11	91	15	,,	Bo.	=4	8·0	
,, 12	92	t.22	1	Ni.	3−1·5, 5+3	7·9	
,, 17	9997	15	2	Bo.	4−1, 5+1	8·1	
,, 22	0002	t.22	1	Ni.	5−0·5	8·2	
,, 23	03	15	,,	Bo.	4−1·5, 5+1	8·1	
,, 24	04	45	,,	Bh.	5+2	8·0	
,, 27	07	,,	,,	,,	5−1	8·3	
,, 27	07	15	,,	Bo.	4−2, 5+0·5	8·1	
,, 28	08	t.60	2	Bn.	5−2	8·4	
Sept. 6	17	t.30	1	,,	5−4, 7+12	8·6	
,, 6	17	90	,,	Bh.	5−10, 7+5	9·2	
,, 6	17	t.22	,,	Ni.	l−2·5, 7+7	9·1	
,, 7	18	T.50	,,	Bn.	5−9, m+3·5	9·1	
,, 9	20	45	,,	Bh.	5−9, 7+6	9·1	
,, 11	22	25	,,	Bo.	5−4, 7+12	8·6	
,, 12	23	t.22	,,	Ni.	l−2, 7+7	9·0	
,, 20	31	45	,,	Bh.	6+3, 7+2	9·6	
,, 24	35	25	,,	Bo.	5−6, 7+9	8·8	
,, 24	35	T.50	,,	Bn.	7+2	9·6	
,, 26	0037	T.94	,,	Ni.	7+0·5	9·7	In t.22, 9·9.

(3825) R URSÆ MAJORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Sept. 27	0038	25	1	Bo.	5−6, 7+9	8·8	
,, 28	39	T.50	,,	Bn.	7−3·5, 9+1	10·1	
Oct. 3	44	T.94	,,	Ni.	=10	10·5	
,, 4	45	90	,,	Bh.	7−3, 10+2, 12+3	10·2	
,, 13	54	,,	2	,,	10−5, =12, 13+3, 14+5	10·8	
,, 16	57	T.94	,,	Ni.	12−3, 14+4	11·0	
,, 17	58	90	1	Bh.	10−5, =13, 14+5	11·0	
,, 22	63	,,	2	,,	14+2	11·3	
,, 25	66	T.94	1	Ni.	12−6, 14+1	11·3	
,, 31	72	90	2	Bh.	14−3, 18+3	11·8	
Nov. 3	75	T.94	1	Ni.	=14	11·5	
,, 5	77	150	,,	Bh.	14−5, 18+1, 23+5	12·0	
,, 18	90	90	2	,,	18−2, =23	12·4	
,, 21	93	T.94	1	Ni.	20−1, 23+1	12·4	
,, 22	94	T.120	,,	Bn.	14−4·5, 18+1	11·9	
,, 24	0096	90	,,	Bh.	18−4, =23, 26+4	12·5	
Dec. 7	0109	T.94	,,	Ni.	=23	12·5	
,, 9	11	150	2	Bh.	=26, =27	13·0	
,, 16	18	,,	,,	,,	=26, 27+1	12·9	
,, 18	20	T.94	1	Ni.	=23	12·5	
,, 18	20	T.150	,,	Bn.	18−4, 23+1	12·4	
,, 23	25	150	2	Bh.	23−4, =26, 27+2	12·9	
,, 29	31	,,	1	,,	=27, =28	13·1	
,, 30	32	T.94	,,	Ni.	23+0·5	12·5	
1914.							
Jan. 3	36	T.150	2	Bn.	23−3	12·8	
,, 6	39	150	,,	Bh.	27−1, =28	13·1	
,, 14	47	,,	,,	,,	=27, =29	13·1	
,, 15	48	T.94	1	Ni.	23−4·5, 27+1	13·0	
,, 23	56	150	,,	Bh.	23−4, 27+1, 29+2	13·0	
,, 25	58	,,	,,	,,	23−3, =27, 29+3	12·9	
,, 26	59	T.150	,,	Bn.	23−4, 29+1	13·0	
Feb. 1	65	T.94	,,	Ni.	23−3, 27+2	12·9	
,, 2	66	90	,,	Bh.	23−1, 26+1	12·7	
,, 8	72	,,	,,	,,	18−5, =23	12·5	
,, 13	77	T.94	,,	Ni.	=23	12·5	
,, 15	79	90	,,	Bh.	18−3, 23+1·5	12·4	
,, 18	82	T.150	,,	Bn.	23−4, 29+2	12·9	
,, 18	82	183	,,	Ma.	23−3, 29+3	12·8	
,, 21	85	T.94	,,	Ni.	23+0·5	12·5	
,, 22	86	T.150	,,	Bn.	23−2, 29+4	12·7	
,, 22	86	150	,,	Bh.	18−4, =23, 26+4	12·5	
,, 26	90	90	,,	,,	18−2, =20, 23+2	12·3	
,, 26	90	T.150	,,	Bn.	23−2, 29+4	12·7	
Mar. 1	93	183	,,	Ma.	23+2, 29+2	12·6	
,, 1	93	T.94	,,	Ni.	=23	12·5	
,, 7	0199	90	2	Bh.	17−1, 20+3	11·9	
,, 16	0208	T.94	1	Ni.	=17	11·8	

(3825) R URSÆ MAJORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Mar. 19	0211	183	1	Ma.	14−3, 18+3	11·8	
„ 21	13	150	„	Bh.	14−2, =17, 18+4	11·7	
„ 21	13	T.120	„	Bn.	14−1, 18+4·5	11·6	
„ 22	14	T.94	„	Ni.	12−6·5, 14+1	11·4	
„ 25	17	90	2	Bh.	=14	11·5	
„ 27	19	80	„	Tm.	13−2, 14+3	11·2	
„ 28	20	25	„	Bo.	12−1·5, 14+6	10·9	
„ 29	21	90	1	Bh.	12−4, 14+4	11·1	
„ 29	21	80	3	Tm.	10−1, 13+4	10·6	
„ 31	23	90	1	Bh.	7−5, 12+5	10·2	
„ 31	23	T.50	„	Bn.	=9, 10+1	10·3	
„ 31	23	t.22	„	Ni.	7−2, =10, 12+2	10·3	
Apr. 1	24	90	„	Bh.	=6, =7	9·8	
„ 1	24	80	2	Tm.	6−1, =7	9·9	
„ 4	27	40	1	Bc.	k−3, m+2	9·2	
„ 5	28	90	„	Bh.	5−10, 7+5	9·2	
„ 6	29	„	„	„	5−6, 7+9	8·8	
„ 6	29	40	„	Bc.	k−3, m+2	9·2	
„ 8	31	80	2	Tm.	5−3, 7+12	8·5	
„ 12	35	90	1	Bh.	5−3, 7+12	8·5	
„ 12	35	40	„	Bc.	=l, k+1	8·8	
„ 12	35	t.22	„	Ni.	5−5, l+1	8·7	
„ 14	37	90	„	Bh.	=5	8·2	
„ 15	38	80	2	Tm.	=5	8·2	
„ 17	40	40	1	La.	=5	8·2	
„ 18	41	„	„	Bc.	5−4, l+4	8·5	
„ 18	41	25	„	Bo.	5−1·5	8·3	
„ 18	41	t.22	„	Ni.	5−1, l+5	8·3	
„ 22	45	45	„	Bh.	3−2, =4, 5+2	7·9	
„ 22	45	20	„	La.	3−3, 5+2	8·0	
„ 24	47	80	2	Tm.	=5	8·2	
„ 25	48	25	1	Bo.	4−1, 5+1	8·1	
„ 26	49	t.22	„	Ni.	3−4, 5+1	8·1	Whitish yellow.
„ 27	50	T.50	„	Bn.	4−1, =5	8·1	
„ 28	51	t.30	„	„	4−1·5, 5+1	8·1	
„ 28	51	20	„	La.	3−2, 5+3	7·9	
„ 28	51	45	„	Bh.	=3	7·7	
May 2	55	25	„	Bo.	4−0·5, 5+2	8·0	
„ 3	56	20	„	La.	3−3, 5+2	8·0	
„ 6	59	40	„	Bc.	3−3, 5+2	8·0	
„ 8	61	25	2	Bo.	=4	8·0	
„ 9	62	45	1	Bh.	=3, =4	7·8	
„ 11	64	20	„	La.	=3, 5+4	7·7	
„ 15	68	45	„	Bh.	5+3	7·9	
„ 15	68	25	„	Bo.	4−0·5, 5+2	8·0	
„ 15	68	t.22	„	Ni.	=5	8·2	
„ 15	68	79	„	Ma.	5+3	7·9	
„ 16	69	T.50	„	Bn.	4−1·5, 5+1	8·1	
„ 21	74	„	„	„	4−1, =5	8·1	
„ 21	74	25	„	Bo.	4−1, 5+1	8·1	
„ 21	74	20	„	La.	3−2, 5+3	7·9	
„ 25	78	T.50	„	Bn.	4−2, 5+0·5	8·1	
„ 26	79	80	2	Tm.	=5	8·2	
„ 28	0281	25	1	Bo.	4−1, 5+1	8·1	

(3825) R URSÆ MAJORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
May 28	0281	40	1	La.	3−2, 5+3	7·9	
„ 30	83	t.22	„	Ni.	5−2, l+4·5	8·4	In T.94, 8·2. Yellow.
„ 31	84	45	2	Bh.	3−2, 5+2	7·9	
June 3	87	„	1	„	3−2, 5+2	7·9	
„ 3	87	25	„	Bo.	4−1, =5	8·1	
„ 4	88	T.50	„	Bn.	4−2, =5	8·2	
„ 5	89	40	„	Bc.	3+3	7·4	
„ 6	90	t.22	2	Ni.	5−3·5, l+2	8·6	
„ 9	93	80	1	Tm.	=5	8·2	
„ 10	94	45	„	Bh.	5+1	8·1	
„ 11	95	25	2	Bo.	4−2, 5+0·5	8·1	
„ 13	97	20	1	La.	3−4, 5+1	8·1	
„ 15	0299	90	„	Bh.	5−2	8·4	
„ 17	0301	T.50	„	Bn.	5−2	8·4	
„ 18	02	20	„	La.	3−5, =5	8·2	
„ 19	03	45	„	Bh.	5−8, 6+8	9·0	
„ 22	06	20	„	La.	3−5, =5, l+4	8·3	
„ 24	08	T.50	„	Bn.	5−9·5, m+3	9·1	
„ 26	10	25	„	Bo.	5−5, 7+10	8·7	
„ 27	11	50	„	Ma.	5−3, 7+12	8·5	
„ 29	13	90	„	Bh.	5−12, 7+3	9·4	
„ 30	14	t.22	„	Ni.	l−7, 7+2	9·5	
July 1	15	40	„	Bc.	k−1, m+4	9·0	
„ 1	15	20	„	La.	5−5, =k, l+3	8·7	
„ 3	17	45	„	Bh.	7−2, =6	9·9	
„ 4	18	40	„	Bc.	=m	9·4	
„ 4	18	T.50	„	Bn.	m+1	9·3	
„ 6	20	50	„	Ma.	5−13, 7+2	9·5	
„ 7	21	t.22	„	Ni.	=7	9·8	
„ 9	23	15	2	Bo.	5−8, 7+8	9·0	
„ 11	25	40	1	Bc.	m−2	9·6	
„ 14	28	T.50	„	Bn.	8−1, 9+0·5	10·2	
„ 14	28	45	„	Bh.	7−3, 10+5, 12+6	10·0	
„ 14	28	40	„	La.	m−4, =7	9·8	
„ 15	29	79	„	Ma.	7−6, 12+3	10·4	
„ 16	30	t.22	2	Ni.	7−5, 10+2	10·3	
„ 20	34	40	1	Bc.	m−4, =7	9·8	
„ 20	34	90	„	Bh.	7−8, 12+2	10·5	
„ 20	34	79	„	Ma.	7−6, 12+4	10·3	
„ 23	37	„	„	„	12+1	10·6	Slightly red.
„ 27	41	„	„	„	12+1	10·6	
„ 27	41	T.94	„	Ni.	12+2	10·5	In t.22, 12·7.
„ 27	41	40	„	Bc.	7−4	10·2	
„ 28	42	„	„	La.	7−5, 10+2	10·3	
„ 28	42	80	„	Tm.	=10	10·5	
„ 28	42	90	„	Bh.	10−4, =12, 14+4	10·9	
„ 30	44	80	2	Tm.	=11	10·6	
Aug. 2	47	79	1	Ma.	12−2·5, 14+5	11·0	
„ 7	52	90	„	Bh.	14+4	11·1	
„ 10	55	T.94	„	Ni.	12−4, 14+4	11·1	
„ 11	56	40	2	La.	12−4, 14+4	11·1	
„ 14	0359	90	1	Bh.	=14	11·5	

(3825) R URSÆ MAJORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Aug. 17	0362	T.94	1	Ni.	12−5·5, 14+2	11·3	
,, 21	66	90	,,	Bh.	14−4, =18, 20+4	11·9	
,, 24	69	40	3	La.	14−2	11·7	Difficult.
,, 26	71	T.120	1	Bn.	13−3, 14+1·5	11·3	
,, 30	75	,,	,,	,,	13−3·5, 14+1	11·4	
Sept. 1	77	90	2	Bh.	=18, =20	12·1	
,, 1	77	T.94	1	Ni.	12−6, 14+2	11·3	
,, 8	84	T.150	,,	Bn.	14−3·5, 18+2	11·8	
,, 10	86	90	,,	Bh.	18+1	11·9	
,, 19	95	80	2	Tm.	=18, =19	12·1	
,, 19	95	150	1	Bh.	14−5, 18+1, 23+3	12·0	
,, 22	0398	T.94	,,	Ni.	20−0·5, 23+2	12·3	
,, 24	0400	T.120	,,	Bn.	14−4, 18+1·5	11·9	
,, 25	01	90	,,	Bh.	18−1·5, 23+3	12·2	
Oct. 10	16	,,	,,	,,	18−2, 23+2	12·3	
,, 18	24	,,	,,	,,	18−1·5, =20, 23+3	12·2	
,, 27	33	,,	,,	,,	18−2, =20, 23+2	12·3	
Nov. 7	44	,,	,,	,,	18−1·5, =20, 23+3	12·2	
,, 10	47	,,	,,	,,	18−3, 20−1, 23+1·5	12·4	
,, 12	49	T.94	2	Ni.	23+1	12·4	
,, 14	51	90	1	Bh.	18−3, 23+1·5	12·4	
,, 16	53	T.120	,,	Bn.	14−4·5, 18+1	11·9	
,, 17	54	T.94	,,	Ni.	23−1, 27+4	12·7	
,, 20	57	150	,,	Bh.	23−1, 26+2	12·6	
,, 26	63	90	,,	,,	18−5, 23−1, 27+5	12·6	
Dec. 1	68	,,	,,	,,	=23	12·5	
,, 5	72	T.150	,,	Bn.	14−4·5, 18+1	11·9	
,, 7	74	90	,,	Bh.	18−2, 23+2	12·3	
,, 10	77	150	,,	,,	18−2, 23+3	12·2	
,, 10	77	80	2	Tm.	=18, =19	12·1	
,, 14	81	150	1	Bh.	18−1·5, 23+3	12·2	
,, 16	83	T.120	,,	Bn.	14−2, 18+2	11·8	
,, 16	83	T.94	,,	Ni.	14−5, 20+3	12·0	
,, 18	85	80	,,	Tm.	14−1, 17+2	11·6	
,, 19	86	150	2	Bh.	14−7, =18, 23+3·5	12·1	
,, 21	88	T.94	1	Ni.	14+1	11·4	
,, 23	90	90	,,	Bh.	=14	11·5	
,, 24	91	T.94	,,	Ni.	12−6·5, 14+1	11·4	
,, 29	0496	150	,,	Bh.	10−7, 14+2, 17+7, 18+6	11·3	

(4511) T URSÆ MAJORIS. (V. 3.)

H.D. 123160.

Combined magnitude of (6 + 15) = 8·69.

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Jan. 1	8673	t.30	2	Bn.	(6+15)−3, 7+1·5	9·0	
,, 3	75	t.22	1	Ni.	4−4, 7+4	8·8	
,, 8	80	t.30	2	Bn.	4−2, (6+15)+1	8·6	
,, 10	82	,,	1	,,	2−2, =4	8·3	
,, 10	82	45	,,	Br.	2−3, 4+1	8·3	
,, 11	83	t.30	,,	Bn.	2−2, 4+1	8·2	
,, 17	89	t.22	,,	Ni.	2−0·5, 4+3	8·1	
,, 19	91	t.30	,,	Bn.	2+3	7·7	
,, 20	8692	45	,,	Br.	2+4, 4+7	7·6	
,, 30	8702	t.22	,,	Ni.	c−1, 2+6	7·4	
,, 30	02	B.	,,	Bn.	b−4, d+1	7·4	
Feb. 2	05	50	,,	Ma.	2−1, 4+3	8·1	
,, 4	07	B.	,,	Bn.	b−4, d+1	7·4	
,, 8	11	,,	,,	,,	b−4, d+1	7·4	
,, 9	12	,,	2	,,	b−3, d+3	7·3	
,, 9	12	t.22	1	Ni.	b−1, c+3	7·0	
,, 10	13	B.	,,	Bn.	b−3, d+3	7·3	
,, 11	14	,,	2	,,	b−3, d+3	7·3	
,, 11	14	45	1	Br.	2+10	7·0	
,, 15	18	B.	,,	Bn.	b−3, d+2	7·3	
,, 18	21	t.22	,,	Ni.	b−2, c+1·5	7·2	Yellowish white.
,, 21	24	45	,,	Br.	2+7	7·3	
,, 23	26	t.30	2	Bn.	2+7, 4+10	7·3	
,, 27	30	t.22	1	Ni.	b−2, c+1	7·2	
,, 28	31	50	,,	Ma.	2−2, 4+2	8·2	
Mar. 1	32	45	,,	Br.	2+7	7·3	
,, 3	34	50	,,	Ma.	2+2	7·8	
,, 8	39	45	,,	Br.	2+4	7·6	
,, 13	44	50	,,	Ma.	=2, 4+3	8·0	
,, 13	44	t.22	,,	Ni.	2+0·5	8·0	
,, 15	46	45	,,	Br.	2+1	7·9	
,, 16	47	T.25	,,	Bn.	2+1	7·9	
,, 19	50	50	,,	Ma.	2−0·5, 4+2	8·1	
,, 20	51	t.22	,,	Ni.	2−1, 4+2	8·1	Whitish yellow.
,, 22	53	t.30	,,	Bn.	2−2, =4	8·3	
,, 25	56	50	2	Ma.	4−1, 5+5	8·5	
,, 26	57	t.30	1	Bn.	4−0·5, (6+15)+3	8·4	
,, 27	58	50	2	Ma.	4−1, 5+5	8·5	
,, 29	60	t.22	1	Ni.	4−1·5, 7+6	8·5	Yellowish white.
,, 29	60	t.30	,,	Bn.	4−2·5, (6+15)+1	8·6	
,, 31	62	45	,,	Br.	4−3, 6+2	8·6	
Apr 1	63	50	,,	Ma.	4−5, 5+1·5	8·8	
,, 2	64	t.30	,,	Bn.	4−3, (6+15)+0·5	8·6	
,, 7	8769	,,	2	,,	(6+15)−3, 7+1·5	9·0	

(4511) T URSÆ MAJORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Apr. 11	8773	t.22	1	Ni.	=7	9·2	
,, 15	77	t.60	,,	Bn.	7−1, 9+5·5	9·3	
,, 24	86	t.22	,,	Ni.	9−1·5, 11+3	10·0	
,, 25	87	45	2	Br.	9−2, 11+2	10·1	
May 5	97	T.94	1	Ni.	=11	10·3	
,, 7	8799	45	,,	Br.	11−2. 13+3	10·5	
,, 12	8804	t.60	,,	Bn.	13−1, 17+3	10·9	
,, 18	10	160	,,	Br.	11−5, 17+5	10·8	
,, 22	14	T.94	,,	Ni.	17−2, 20+8	11·5	
,, 29	21	160	,,	Br.	17−3, 21+7	11·6	
June 3	26	T.95	,,	Bn.	18−2, 21+4	12·0	
,, 5	28	T.94	,,	Ni.	17−6, 20+3	11·9	
,, 13	36	160	,,	Br.	20−2, 21−1	12·5	
,, 14	37	T.120	,,	Bn.	=20, =21	12·3	
,, 19	42	T.95	,,	,,	<21	<12·4	Doubtfully glimpsed.
,, 24	47	79	2	Ma.	<18	<11·7	
July 1	54	T.94	1	Ni.	21−2, 25+1·5	12·6	
,, 11	64	,,	,,	,,	21−3, 25+1	12·7	
,, 11	64	T.120	,,	Bn.	21−4	12·8	
,, 11	64	240	,,	Br.	=27	12·8	
,, 29	82	T.94	,,	Ni.	23−1, 25+1	12·7	
,, 31	84	240	,,	Br.	20−4, 27+2	12·7	
Aug. 7	91	183	2	Ma.	20−3	12·6	Doubtful.
,, 10	94	160	1	Br.	=20, =21	12·3	
,, 10	94	T.94	,,	Ni.	21−1, 23+1	12·5	
,, 12	8896	183	,,	Ma.	=20	12·3	
,, 19	8903	T.94	2	Ni.	17−6, 20+3	11·9	
,, 22	06	,,	1	,,	=17	11·3	
,, 22	06	45	2	Br.	17−5, 20+5	11·8	
,, 30	14	T.94	1	Ni.	14−6, 17+3	11·0	
,, 31	15	45	,,	Br.	15−1, 17+3	11·0	
Sept. 3	18	t.75	,,	Bn.	11−8, 17+2	11·1	
,, 8	23	45	2	Br.	11−4, 17+6	10·7	
,, 9	24	66	1	F.G.B.	11−2, 13+2	10·5	
,, 12	27	45	,,	,,	=9	9·9	
,, 12	27	t.60	,,	Bn.	7−6, 9+1	9·8	
,, 17	32	45	,,	Br.	7−2, 9+4	9·4	
,, 20	35	t.30	,,	Bn.	(6+15)−4, 7+1	9·1	
,, 20	35	45	,,	F.G.B.	4−5, 5+1	8·9	
,, 20	35	t.22	,,	Ni.	7−1, 9+5	9·3	
,, 25	40	,,	2	,,	4−4, 7+4·5	8·7	
,, 27	42	45	1	F.G.B.	=4	8·3	
,, 27	42	t.30	,,	Bn.	(6+15)−1·5, 7+3	8·9	
,, 29	44	,,	,,	,,	4−2·5, (6+15)+1	8·6	
Oct. 3	48	,,	,,	,,	2−2, 4+1	8·2	
,, 6	51	,,	,,	,,	2−1, 4+2	8·1	
,, 6	51	t.22	,,	Ni.	=4	8·3	Whitish yellow.
,, 14	59	,,	,,	,,	2−2, 4+2	8·2	
,, 14	8959	45	,,	Br.	=2	8·0	

(4511) T URSÆ MAJORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Oct. 15	8960	45	1	F.G.B.	2−1, 4+3	8·1	
„ 23	68	t.22	„	Ni.	=4	8·3	
Nov. 1	77	45	2	F.G.B.	2−2, 4+2	8·2	
„ 1	77	t.30	1	Bn.	2−1, 4+2	8·1	
„ 4	80	„	2	„	2−2, 4+1	8·2	
„ 5	81	t.22	1	Ni.	=4	8·3	
„ 6	82	45	„	Br.	4−1, 6+4	8·4	
„ 11	87	t.30	„	Bn.	2−2, =4	8·3	
„ 14	90	t.22	„	Ni.	4−2·5, 7+6	8·6	
„ 15	91	45	„	Br.	2−2, 4+1	8·2	
„ 16	92	t.30	„	Bn.	4−1, (6+15)+2·5	8·4	
„ 16	92	45	„	F.G.B.	2−2, 4+1	8·2	
„ 20	96	t.30	„	Bn.	4−1, (6+15)+2	8·5	
„ 23	8999	t.22	„	Ni.	4−2·5, 7+6	8·6	
„ 28	9004	t.30	„	Bn.	(6+15)−4, 7+1	9·1	
„ 29	05	45	„	Br.	4−3, 6+2	8·6	
Dec. 4	10	t.22	2	Ni.	4−4, 7+4	8·8	
„ 6	12	45	„	F.G.B.	=6	8·8	
„ 13	19	t.22	1	Ni.	7−1	9·3	
„ 18	24	t.60	„	Bn.	7−1, 9+6	9·3	
„ 19	25	60	„	Br.	6−5, 9+4	9·4	
„ 22	28	T.50	„	Bn.	7−5, 9+2	9·7	
„ 24	30	t.60	„	„	7−5, 9+1	9·7	
„ 26	32	45	„	F.G.B.	7−3, 9+3	9·5	
„ 27	33	t.22	„	Ni.	9−0·5	9·9	
„ 27	33	t.60	„	Bn.	7−6, 9+1	9·8	
„ 30	36	„	„	„	=9	9·9	
1911.							
Jan. 1	38	„	„	„	9−3·5, 11+1	10·2	
„ 1	38	45	„	Br.	=9	9·9	
„ 6	43	t.60	„	Bn.	13−1, 17+4	10·9	
„ 6	43	45	„	F.G.B.	9−4, 14+2	10·2	
„ 9	46	T.94	„	Ni.	11−1, 14+1	10·3	
„ 9	46	t.75	„	Bn.	13−2·5	11·0	
„ 16	53	160	2	Br.	11−6, 17+3	10·9	
„ 19	56	60	1	„	11−6, 17+3	10·9	
„ 28	65	160	2	„	17−5, 21+5	11·8	
„ 28	65	66	1	F.G.B.	=17	11·3	
„ 29	66	T.94	„	Ni.	17−5, 20+4	11·8	
„ 31	68	T.50	„	Bn.	17−7, 20+2	12·0	
Feb. 8	76	T.94	„	Ni.	20+0·5	12·2	
„ 19	87	„	„	„	21−1, 25+3	12·5	
„ 22	90	160	„	Br.	20−4, 21−4	12·7	
„ 25	93	T.120	„	Bn.	21−2	12·6	
„ 25	93	66	2	F.G.B.	=21	12·4	
„ 26	94	T.94	1	Ni.	21−2·5, 25+1	12·6	
„ 28	96	240	„	Br.	20−4, 27+2	12·7	
Mar. 2	9098	T.120	„	Bn.	21−3·5	12·7	
„ 4	9100	160	„	Br.	=27	12·8	
„ 5	01	T.94	„	Ni.	21−2·5, 25+1	12·6	
„ 19	9115	„	„	„	=25, 27+0·5	12·8	

(4511) T URSÆ MAJORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
Mar. 21	9117	T.120	1	Bn.	27+2	12·6	
„ 29	25	T.94	2	Ni.	=25, 27+0·5	12·8	
Apr. 3	30	T.120	1	Bn.	21−4, 27+1	12·8	
„ 5	32	T.94	„	Ni.	=25, =27	12·8	
„ 11	38	198	3	F.G.B.	=21	12·4	
„ 15	42	T.94	1	Ni.	23−1, 25+0·5	12·7	
„ 18	45	160	„	Br.	=21	12·4	
„ 19	46	66	„	F.G.B.	21−1·5, 27+3	12·5	
„ 23	50	„	„	„	20−1, 21+0·5	12·3	
„ 26	53	160	„	Br.	20+2, 21+2	12·1	
„ 27	54	66	„	F.G.B.	=20, =21	12·3	
„ 28	55	T.94	„	Ni.	20+1, 21+3	12·1	
May 4	61	T.120	„	Bn.	20+1	12·2	
„ 6	63	T.94	„	Ni.	17−5·5, 20+4	11·8	
„ 8	65	66	„	F.G.B.	17−3, 18+1·5	11·6	
„ 9	66	160	2	Br.	17−5, 21+5	11·8	
„ 14	71	45	1	F.G.B.	14−6, 17+3	11·0	
„ 15	72	T.94	„	Ni.	14−5, 17+3	10·9	
„ 21	78	45	„	Br.	11−4, 13+1	10·7	
„ 22	79	T.120	„	Bn.	=14	10·4	
„ 22	79	45	„	F.G.B.	9−3, 14+3	10·1	
„ 24	81	T.50	„	Bn.	=11	10·3	
„ 26	83	T.94	„	Ni.	9−3·5, 11+1	10·2	
„ 27	84	t.60	„	Bn.	7−6, 9+0·5	9·8	
„ 29	86	„	„	„	7−6, 9+1	9·8	
June 1	89	„	„	„	7−2, 9+4	9·4	
„ 3	91	45	„	F.G.B.	=6	8·8	
„ 4	92	t.22	„	Ni.	4−0·5, 7+8	8·4	Whitish yellow.
„ 6	94	t.30	„	Bn.	4−2·5, (6+15)+1	8·6	
„ 7	95	34	„	Cr.	2−2, 4+2	8·2	
„ 8	9196	t.30	„	Bn.	2+1	7·9	
„ 17	9205	45	2	F.G.B.	c−2, 2+4·5	7·5	
„ 17	05	t.22	1	Ni.	=c	7·3	Whitish yellow.
„ 18	06	45	„	Br.	2+5	7·5	
„ 18	06	t.30	„	Bn.	2+10, 4+13·5	7·0	Doubtful. [C.L.B.]
„ 20	08	10	„	Cr.	d+1	7·5	
„ 27	15	B.	„	Bn.	b−4, d+2	7·4	
July 2	20	45	2	F.G.B.	=c	7·3	
„ 2	20	t.22	1	Ni.	b−2·5, c+1	7·2	Whitish yellow.
„ 10	28	„	„	„	c−1, 2+6	7·4	Yellowish white.
„ 10	28	45	2	F.G.B.	b−2, c+1	7·2	
„ 10	28	10	1	Cr.	=b	7·0	
„ 11	29	„	„	„	b+1	6·9	
„ 18	36	45	2	F.G.B.	=b	7·0	
„ 19	37	t.22	1	Ni.	b−1, c+3	7·0	
„ 21	39	60	„	Br.	2+4	7·6	
„ 22	40	T.25	„	Bn.	2+14, 4+17	6·6	Doubtful. [C.L.B.]
„ 25	43	45	2	F.G.B.	=c	7·3	
„ 26	44	t.22	1	Ni.	=c, 2+6	7·4	
„ 27	45	B.	„	Bn.	b−4, d+2	7·4	
„ 31	9249	„	„	„	b−5, d+1	7·5	

(4511) T URSÆ MAJORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
Aug. 1	9250	160	1	Br.	2+4	7·6	
„ 3	52	t.22	„	Ni.	c−2, 2+5	7·5	
„ 13	62	„	„	„	c−4·5, 2+2	7·8	
„ 14	63	45	„	F.G.B.	=2	8·0	
„ 18	67	34	„	Cr.	=2	8·0	
„ 24	73	t.22	„	Ni.	=4	8·3	
„ 24	73	45	„	Br.	2−2, 4+2	8·2	
„ 27	76	„	„	F.G.B.	2−2, 4+1	8·2	
Sept. 6	86	„	„	„	=5	9·0	
„ 6	86	60	„	Br.	6−3, 7+1	9·1	
„ 14	9294	„	2	„	7−4, 9+3	9·6	
„ 22	9302	T.94	1	Ni.	9−3, 11+1·5	10·1	
„ 24	04	66	„	F.G.B.	11−1, 13+4	10·4	
„ 26	06	34	„	Cr.	=11	10·3	
„ 28	08	T.94	„	Ni.	14−2, 17+6	10·6	
Oct. 1	11	T.95	„	Bn.	13−3, 17+2	11·1	
„ 4	14	45	2	F.G.B.	=17	11·3	
„ 8	18	T.94	„	Ni.	14−5, 17+3·5	10·9	
„ 10	20	160	„	Br.	17−3, 21+6	11·7	
„ 16	26	T.94	1	Ni.	17−6, 20+4	11·9	
„ 26	36	132	2	F.G.B.	21−1	12·5	
„ 26	36	T.94	1	Ni.	17−7·5, 20+2	12·0	
„ 28	38	T.120	„	Bn.	=20, =21	12·3	
„ 28	38	160	„	Br.	20−2	12·5	
Nov. 9	50	132	2	F.G.B.	21−3	12·7	
„ 12	53	105	1	„	20−4·5, 27+1	12·6	
„ 15	56	T.94	2	Ni.	=25	12·8	Very uncertain.
„ 20	61	160	1	Br.	=27	12·8	
„ 21	62	T.94	2	Ni.	=25, =27	12·8	
Dec. 9	80	160	„	Br.	27−3	13·1	Very difficult.
„ 11	82	132	1	F.G.B.	=29	13·0	
„ 14	85	T.94	2	Ni.	27−2·5	13·1	
„ 15	86	160	1	Br.	=27	12·8	
„ 17	88	T.94	2	Ni.	27−1, 29+1	12·9	
„ 24	95	„	„	„	=25, =27	12·8	
„ 25	9396	132	1	F.G.B.	=27	12·8	
1912.							
Jan. 7	9409	T.94	„	Ni.	21−1	12·5	
„ 9	11	132	„	F.G.B.	21−1·5, 27+3	12·5	
„ 14	16	T.94	2	Ni.	=21	12·4	
„ 26	28	T.95	1	Bn.	=20, 21+1	12·3	
„ 26	28	T.94	„	Ni.	17−6, 20+3	11·9	
Feb. 1	34	160	„	Br.	17−3, 20+6	11·6	
„ 2	35	T.94	„	Ni.	14−2, 17+7	10·6	
„ 7	40	t.22	„	„	=11, =14	10·3	
„ 8	41	45	„	F.G.B.	=9	9·9	
„ 11	44	t.60	„	Bn.	7−5, 9+1·5	9·7	
„ 19	52	45	2	Br.	6−2	9·0	
„ 21	54	t.22	„	Ni.	4−1·5, 7+7	8·5	Whitish yellow.
„ 29	9462	45	1	F.G.B.	2−2, 4+2	8·2	

(4511) T URSÆ MAJORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Mar. 3	9465	T.50	1	Bn.	2−1, 4+2	8·1	
,, 3	65	t.22	,,	Ni.	2−2, 4+1·5	8·2	Yellowish white.
,, 6	68	45	,,	Br.	2+1	7·9	
,, 7	69	,,	,,	F.G.B.	=2	8·0	
,, 9	71	t.30	2	Bn.	2−1, 4+2·5	8·1	
,, 19	81	t.22	1	Ni.	c−4, 2+3	7·7	Whitish yellow.
,, 20	82	45	,,	Br.	2+1	7·9	
,, 30	9492	t.22	,,	Ni.	c−3, 2+3	7·7	
Apr. 9	9502	,,	,,	,,	c−4·5, 2+2	7·8	
,, 14	07	45	,,	Br.	=2	8·0	
,, 16	09	,,	,,	F.G.B.	2+1	7·9	
,, 19	12	,,	,,	,,	=2	8·0	
,, 20	13	t.22	,,	Ni.	2−2, 4+1·5	8·2	
,, 21	14	45	,,	F.G.B.	=2	8·0	
,, 23	16	38	2	Gd.	=(6+15)	8·7	
,, 24	17	45	,,	F.G.B.	2−2, 4+1	8·2	
,, 24	17	40	1	La.	4−2, 6+3	8·5	
,, 26	19	20	,,	,,	4−2, 6+2	8·6	
,, 26	19	t.22	,,	Ni.	2−2, =4	8·3	
,, 27	20	45	,,	F.G.B.	4−4·5, 6+1	8·8	
,, 29	22	t.30	,,	Bn.	4−2, (6+15)+2	8·5	
May 8	31	20	2	La.	6−2	9·0	
,, 10	33	t.22	1	Ni.	7−0·5	9·2	
,, 16	39	45	,,	F.G.B.	7−1, 9+5·5	9·3	
,, 17	40	T.50	,,	Bn.	7−5·5, 9+1	9·7	
,, 17	40	t.22	,,	Ni.	7−5, 9+2	9·7	
,, 18	41	45	,,	Br.	7−4, 9+2	9·6	
,, 20	43	,,	,,	F.G.B.	5−7, 9+1	9·7	
,, 24	47	,,	,,	,,	5−8, 9+1	9·8	
,, 25	48	t.22	,,	Ni.	=9	9·9	
June 2	56	T.50	,,	Bn.	11−3, 13+1·5	10·6	
,, 2	56	45	,,	F.G.B.	11−2, 13+2	10·5	
,, 4	58	40	2	La.	=13	10·8	
,, 6	60	45	1	F.G.B.	=17	11·3	
,, 6	60	160	,,	Br.	11−5, 17+5	10·8	
,, 7	61	T.94	,,	Ni.	14−4, 17+5	10·8	
,, 18	72	,,	,,	,,	17−5·5, 20+4	11·8	
,, 18	72	45	,,	F.G.B.	18−4, 21+2	12·2	
,, 21	75	T.120	,,	Bn.	=20, 21+1	12·3	
,, 23	77	160	,,	Br.	20+3	12·0	
July 9	93	T.94	2	Ni.	21−2, 25+1·5	12·6	
,, 11	95	T.120	1	Bn.	<21	<12·4	Glimpsed.
,, 12	9596	T.94	2	Ni.	21−2·5, 25+1	12·6	
Aug. 9	9624	,,	1	,,	<27	<12·8	Not seen.
,, 13	28	,,	,,	,,	<27	<12·8	,, ,,
,, 19	34	,,	,,	,,	<27	<12·8	,, ,,
Sept. 2	48	160	2	Br.	<21	<12·4	,, ,,
,, 4	50	T.94	1	Ni.	23−1, =25	12·7	
,, 11	57	,,	,,	,,	21−1, 25+2	12·5	
,, 15	9661	,,	,,	,,	21−1	12·5	

(4511) T URSÆ MAJORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Sept. 17	9663	160	1	Br.	=20	12·3	
„ 20	66	T.94	„	Ni.	=21	12·4	
Oct. 2	78	„	2	„	17−3·5, 20+6	11·6	
„ 2	78	T.95	1	Bn.	20+2	12·1	
„ 7	83	„	„	„	20+2	12·1	
„ 8	84	T.94	„	Ni.	14−6, 17+2·5	11·0	
„ 10	86	45	2	Br.	11−6, 17+3	10·9	
„ 14	90	T.94	1	Ni.	9−3, 11+1·5	10·1	In t.22, 10·3.
„ 14	90	T.50	„	Bn.	=11	10·3	
„ 17	9693	„	„	„	9−1, 11+3	10·0	
„ 28	9704	40	2	La.	=7	9·2	
„ 29	05	45	„	Br.	=6	8·8	
„ 31	07	t.22	1	Ni.	4−7, 7+1·5	9·0	
Nov. 3	10	60	2	Th.	(6+15)+2	8·5	
„ 7	14	20	1	La.	4−1, (6+15)+3	8·4	
„ 9	16	„	„	„	2−3, 4+1	8·3	
„ 11	18	45	„	Br.	2−2, 4+1	8·2	
„ 13	20	t.30	„	Bn.	2−2·5, =4	8·3	
„ 13	20	20	„	La.	2−2, 4+1	8·2	
„ 20	27	t.22	„	Ni.	2−2, 4+1	8·2	
„ 25	32	20	„	La.	2−2, 4+2	8·2	
„ 27	34	T.25	„	Bn.	2−2, 4+1	8·2	
„ 30	37	T.50	„	„	2−2, 4+1	8·2	
Dec. 3	40	20	„	La.	2−2, 4+1	8·2	
„ 4	41	45	„	Br.	=4	8·3	
„ 4	41	t.22	2	Ni.	2−2, 4+1	8·2	
„ 5	42	20	1	La.	2−1, 4+2	8·1	
„ 7	44	„	„	„	2−2, 4+2	8·2	
„ 7	44	60	2	Th.	=4	8·3	
„ 11	48	20	1	La.	2−2, 4+2	8·2	
„ 12	49	t.30	„	Bn.	2−2, 4+1	8·2	
„ 12	49	t.22	„	Ni.	2+0·5	8·0	Yellow.
„ 18	55	T.50	„	Bn.	2−2, 4+1	8·2	
„ 20	57	t.22	„	Ni.	2−2, 4+2	8·2	
„ 23	60	45	„	Br.	2−2, 4+1	8·2	
„ 28	65	60	2	Th.	=4	8·3	
„ 29	66	T.50	1	Bn.	4−3, 6+1	8·7	
1913.							
Jan. 1	69	t.30	„	„	4−1, (6+15)+2·5	8·4	
„ 2	70	45	„	Br.	2−2, 4+1	8·2	
„ 3	71	t.22	„	Ni.	4−1·5, 7+7	8·5	
„ 5	73	T.50	„	Bn.	4−2, 6+3	8·5	
„ 12	80	t.30	„	„	(6+15)−3, 7+1·5	9·0	
„ 12	80	20	„	La.	4−4, 5+1	8·8	
„ 15	83	t.22	„	Ni.	4−6, 7+2·5	8·9	
„ 18	86	45	„	Br.	=6, 7+2	8·9	
„ 26	94	T.50	„	Bn.	7−4, 9+3	9·6	
„ 31	9799	t.22	„	Ni.	9+0·5	9·8	
Feb. 5	9804	45	„	Br.	=9, 11+4	9·9	
„ 8	9807	T.50	„	Bn.	11−1, 13+3	10·4	

(4511) T URSÆ MAJORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Feb. 8	9807	t.22	1	Ni.	9−3, 11+1	10·2	
,, 10	09	40	2	La.	9−2	10·1	
,, 17	16	T.94	1	Ni.	11−0·5, 14+1	10·3	
,, 25	24	,,	,,	,,	14−3, 17+5	10·7	
,, 25	24	45	,,	Br.	11−5, 13+1, 17+5	10·7	
,, 25	24	40	2	La.	16−2	11·2	
,, 27	26	62	,,	Th.	14−2, 17+6	10·6	
Mar. 2	29	40	,,	La.	14−4, 16+2	10·8	
,, 7	34	,,	,,	,,	=18	11·7	Very difficult.
,, 8	35	T.95	1	Bn.	17+1	11·2	
,, 8	35	T.94	,,	Ni.	14−7, 17+2	11·1	
,, 8	35	50	,,	Ma.	13−2·5	11·0	Doubtful.
,, 11	38	45	,,	Br.	17−2	11·5	
,, 11	38	62	,,	Th.	17−7, =19, 20+2	12·0	
,, 23	50	T.94	,,	Ni.	=20, =21	12·3	
,, 27	54	79	,,	Ma.	20+2, 21+3	12·1	
,, 28	55	T.120	,,	Bn.	21−1	12·5	
,, 28	55	160	,,	Br.	20+2	12·1	
Apr. 2	60	T.94	,,	Ni.	21−1, 23+1	12·5	
,, 5	63	155	,,	Th.	20−2, 24+2	12·5	
,, 22	80	T.94	,,	Ni.	21−1, =23	12·5	
,, 25	83	160	2	Br.	21−2	12·6	
May 6	94	T.95	1	Bn.	21−5	12·9	
,, 9	97	160	,,	Br.	20−2, 21−3	12·6	
,, 11	9899	T.94	,,	Ni.	21−0·5, 23+1	12·4	
,, 17	9905	160	,,	Br.	20+1	12·2	
,, 22	10	T.94	,,	Ni.	17−6, 20+3	11·9	
,, 25	13	T.95	,,	Bn.	17−1	11·4	
,, 25	13	79	,,	Ma.	17−2, 21+9	11·5	
,, 27	15	160	,,	Br.	17−4, 21+7	11·7	
,, 30	18	T.50	,,	Bn.	14−7, 17+2	11·1	
,, 30	18	120	2	Th.	=17	11·3	
,, 31	19	79	1	Ma.	11−6, 17+3	10·9	
June 1	20	45	,,	Br.	17−1	11·4	
,, 2	21	T.94	,,	Ni.	14−6·5, 17+2	11·1	
,, 3	22	62	2	Th.	11−7, 17+2	11·0	
,, 4	23	24	,,	Bo.	=17	11·3	
,, 4	23	T.50	1	Bn.	14−5·5, 17+3	11·0	
,, 7	26	34	,,	Cr.	17−2, 18+2	11·5	
,, 7	26	50	,,	Ma.	14−2, =18	11·2	
,, 8	27	40	2	La.	=17	11·3	
,, 10	29	,,	,,	,,	13−3	11·1	
,, 10	29	50	1	Ma.	11−5, 14−2, 17+5	10·7	
,, 12	31	40	2	La.	13−1	10·9	
,, 14	33	T.94	1	Ni.	11−1, =14	10·4	
,, 15	34	34	2	Cr.	17−2	11·5	
,, 15	34	T.50	1	Bn.	11−1	10·4	
,, 16	35	79	,,	Ma.	=11	10·3	
,, 17	36	34	2	Cr.	17−1	11·4	
,, 21	40	40	1	La.	=11, 14+2	10·2	
,, 23	42	T.50	,,	Bn.	9−1, 11+3	10·0	
,, 27	9946	t.60	,,	,,	7−5, 9+2	9·7	

(4511) T URSÆ MAJORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
June 27	9946	50	1	Ma.	=9	9·9	
„ 29	48	34	2	Cr.	9+3	9·6	
„ 30	49	24	1	Bo.	6−2, 8+2	9·1	
July 3	52	t.60	„	Bn.	6−2·5, 7+1	9·1	
„ 8	57	t.22	„	Ni.	2−2, 4+1	8·2	
„ 11	60	t.30	„	Bn.	2+2	7·8	
„ 12	61	20	„	La.	d−3, 2+1·5	7·9	
„ 12	61	t.22	„	Ni.	c−2·5, 2+4	7·6	
„ 13	62	50	„	Ma.	2+2	7·8	
„ 16	65	T.50	2	Bn.	2+3	7·7	
„ 20	69	T.25	1	„	b−2·5, c+1	7·2	
„ 22	71	F.	2	Th.	1−3, b+3	6·7	
„ 23	72	50	1	Ma.	2+3	7·7	Reddish.
„ 24	73	15	2	Bo.	d−2, 2+2	7·8	
„ 26	75	20	1	La.	1−1, b+4	6·5	
„ 28	77	15	„	Bo.	=b	7·0	
„ 29	78	F.	2	Th.	1−2, b+3	6·6	
„ 29	78	B.	1	Bn.	1−3, b+2	6·7	
„ 30	79	„	„	„	1−2, b+3·5	6·6	
„ 31	80	15	„	Bo.	1−4, b+1	6·8	
Aug. 1	81	45	2	Br.	2+7	7·3	Difficult.
„ 1	81	50	1	Ma.	2+5	7·5	
„ 2	82	34	2	Cr.	=b	7·0	
„ 2	82	F.	1	Th.	1−2·5	6·7	
„ 3	83	50	„	Ma.	2+6·5	7·4	Slightly red.
„ 7	87	B.	2	Th.	1−3, b+3	6·7	
„ 11	91	15	„	Bo.	1−3, b+3	6·7	
„ 12	92	t.22	1	Ni.	b−2, c+1	7·2	
„ 17	9997	15	2	Bo.	1−3, b+3	6·7	
„ 20	0000	„	1	„	1−2, b+4	6·6	
„ 22	02	t.22	„	Ni.	=b	7·0	
„ 23	03	20	„	La.	1−4, b+1	6·8	
„ 23	03	15	„	Bo.	1−1, b+4	6·5	
„ 24	04	45	„	Br.	2+6	7·4	About.
„ 27	07	15	„	Bo.	1−1, b+3·5	6·6	
„ 28	08	t.30	2	Bn.	b−5, d+1	7·5	
Sept. 3	14	50	„	Ma.	2+5	7·5	
„ 4	15	t.22	1	Ni.	b−2·5, c+1	7·2	
„ 6	17	B.	„	Bn.	c−1, d+2	7·4	
„ 7	18	45	„	Br.	2+5	7·5	
„ 7	18	37	2	Th.	2+2·5	7·8	
„ 7	18	50	„	Ma.	4+3	8·0	
„ 10	21	t.22	1	Ni.	c−3, 2+3	7·7	
„ 14	25	37	3	Th.	c−3, 2+3	7·7	
„ 18	29	T.50	1	Bn.	2+1	7·9	
„ 20	31	24	„	Bo.	=2	8·0	
„ 21	32	t.22	„	Ni.	=2	8·0	
„ 23	34	20	„	La.	=2, 4+3	8·0	
„ 24	35	62	„	Th.	=4	8·3	
„ 24	35	45	„	Br.	2+1	7·9	
„ 24	35	24	„	Bo.	=2	8·0	
„ 26	37	20	„	La.	2−3, =4	8·3	
„ 27	0038	24	„	Bo.	=4	8·3	

(4511) T URSÆ MAJORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Sept. 27	0038	t.22	1	Ni.	=4	8·3	
,, 28	39	T.50	,,	Bn.	2−2, =4	8·3	
Oct. 4	45	24	3	Bo.	4−4, 5+2	8·8	
,, 9	50	37	1	Th.	=5	9·0	
,, 9	50	40	,,	La.	4−3, 6+1	8·7	
,, 12	53	24	2	Bo.	=5	9·0	
,, 14	55	37	1	Th.	6−2, 7+2	9·0	
,, 17	58	45	,,	Br.	6−3, 7+1	9·1	
,, 17	58	T.94	2	Ni.	=7	9·2	In t.22, 9.5.
,, 21	62	40	1	La.	7−3, 9+3	9·5	
,, 25	66	,,	2	,,	7−3, 9+3	9·5	
,, 25	66	24	,,	Bo.	7−5, 9+1	9·7	
,, 28	69	T.94	1	Ni.	9−1, 11+3	10·0	
Nov. 1	73	79	,,	Ma.	9−3, 14+3	10·1	
,, 1	73	T.50	,,	Bn.	9−2, 11+1	10·1	
,, 1	73	24	,,	Bo.	10−2, 12+6	9·7	
,, 1	73	45	,,	Br.	9−2, 11+2	10·1	
,, 7	79	62	2	Th.	9−4, 14+1	10·3	
,, 12	84	,,	3	,,	=13	10·8	Very difficult.
,, 18	90	40	2	La.	14−1, 13+2	10·5	
,, 21	93	62	,,	Th.	=17	11·3	
,, 22	94	45	1	Br.	11−8, 17+3	11·0	
,, 22	94	T.95	,,	Bn.	13−4, 17+1	11·2	
,, 22	0094	T.94	,,	Ni.	14−7, 17+1·5	11·1	
Dec. 4	0106	160	,,	Br.	17−6, 21+6	11·8	
,, 7	09	T.94	,,	Ni.	20+0·5	12·2	
,, 9	11	120	2	Th.	=20, =21	12·3	
,, 18	20	T.94	1	Ni.	20−3·5, 21−1	12·5	
,, 18	20	T.120	,,	Bn.	21−1	12·5	
,, 22	24	120	,,	Th.	21−1, 24+1	12·5	
,, 23	25	,,	2	,,	21−2	12·6	
,, 24	26	,,	1	Br.	20−2, 27+3	12·5	
,, 30	32	T.94	,,	Ni.	21−3, 25+0·5	12·7	
1914.							
Jan. 2	35	120	,,	Br.	=27	12·8	
,, 5	38	157	2	Th.	=24	12·7	
,, 6	39	,,	,,	,,	24−1	12·8	
,, 17	50	T.94	,,	Ni.	=25	12·8	
,, 22	55	145	1	Th.	24−2	12·9	
,, 23	56	120	,,	Br.	20−4, 27+2	12·7	
,, 26	59	T.150	,,	Bn.	27+2	12·6	
Feb. 1	65	T.94	,,	Ni.	20−4, 21−6, 25+1	12·8	
,, 1	65	145	2	Th.	21−1, 24+1	12·5	
,, 15	79	T.120	,,	Bn.	20−0·5, 21+1	12·3	
,, 16	80	157	1	Th.	=20	12·3	
,, 18	82	160	,,	Br.	=21	12·4	
,, 18	82	T.95	,,	Bn.	=20	12·3	
,, 21	85	T.94	,,	Ni.	17−6, 20+2, 21+3	12·0	
,, 22	86	T.120	,,	Bn.	18−3·5, 20+2	12·1	
,, 26	0190	,,	,,	,,	17−3, 18+1·5	11·6	

(4511) T URSÆ MAJORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Mar. 1	0193	50	1	Ma.	13−1	10·9	
„ 1	93	40	„	Bc.	13−2	11·0	
„ 1	93	T.94	„	Ni.	17−0·5	11·3	
„ 1	93	45	„	Br.	11−5, 17+5	10·8	
„ 6	98	T.50	„	Bn.	9−1, 11+2	10·0	
„ 7	0199	24	2	Bo.	10−4, 12+4	9·9	
„ 10	0202	t.22	„	Ni.	7−4, 9+3	9·6	
„ 10	02	30	1	Tn.	7−2, 9+5	9·4	
„ 16	08	45	„	Br.	6−1, 7+2	9·0	
„ 18	10	t.22	„	Ni.	4−5, 7+3·5	8·8	
„ 18	10	79	„	Ma.	4−3, 5+3	8·7	
„ 21	13	30	„	Tn.	4−1, 5+5	8·5	
„ 21	13	T.50	„	Bn.	4−4, 6+1	8·7	
„ 24	16	30	2	Tn.	=4	8·3	
„ 26	18	40	1	Bc.	4−3, 6+2	8·6	
„ 27	19	30	„	Tn.	=4	8·3	
„ 27	19	T.50	„	Bn.	4−2, 6+3	8·5	
„ 27	19	45	„	Br.	=4	8·3	
„ 28	20	24	„	Bo.	4−1, 5+5	8·5	
„ 31	23	T.50	„	Bn.	2−2, =4	8·3	
„ 31	23	t.22	„	Ni.	=4	8·3	Whitish yellow.
Apr. 3	26	30	2	Tn.	=2	8·0	
„ 5	28	40	1	Bc.	=2, 4+3	8·0	
„ 8	31	30	2	Tn.	2+2	7·8	
„ 9	32	40	1	Bc.	=2, 4+3	8·0	
„ 11	34	30	„	Tn.	2+4	7·6	
„ 12	35	24	2	Bo.	2−1, 4+3	8·1	
„ 12	35	t.22	1	Ni.	2−2, 4+1	8·2	
„ 13	36	40	„	Bc.	2+2	7·8	
„ 14	37	30	„	Tn.	2+3	7·7	
„ 15	38	45	„	Br.	2+4	7·6	
„ 16	39	B.	„	Bn.	d−3, 2+1	7·9	
„ 18	41	24	„	Bo.	2+1	7·9	
„ 19	42	30	„	Tn.	2+3	7·7	
„ 20	43	t.22	„	Ni.	2−0·5	8·1	
„ 21	44	40	„	Bc.	2+4	7·6	
„ 24	47	30	„	Tn.	2+3	7·7	
„ 25	48	24	„	Bo.	2+2	7·8	
„ 25	48	B.	„	Bn.	d−2, 2+2	7·8	
„ 26	49	45	„	Br.	2+1	7·9	
„ 26	49	30	„	Tn.	2+2	7·8	
„ 27	50	p.16	„	Bn.	d−2, 2+2	7·8	p.=2″ O.G.
„ 28	51	t.22	„	Ni.	c−1, 2+5·5	7·4	
May 2	55	40	„	Bc.	b−4	7·4	
„ 2	55	24	„	Bo.	2+1	7·9	
„ 6	59	40	„	Bc.	b−4	7·4	
„ 8	61	24	2	Bo.	2+2	7·8	
„ 14	67	45	1	Br.	=2	8·0	
„ 15	68	24	2	Bo.	2+2	7·8	
„ 16	69	T.50	1	Bn.	2−2, =4	8·3	
„ 17	70	t.22	„	Ni.	2−0·5	8·1	
„ 21	74	24	2	Bo.	=2	8·0	
„ 21	75	T.50	1	Bn.	=2	8·0	
„ 25	0278	„	„	„	=4	8·3	

(4511) T URSÆ MAJORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
May 26	0279	45	1	Br.	2−2, 4+1	8·2	
" 28	81	24	"	Bo.	=4	8·3	
" 30	83	t.22	"	Ni.	4−3, 7+6	8·6	
June 3	87	24	2	Bo.	4−1, 5+5	8·5	
" 4	88	T.50	1	Bn.	4−2, 6+2	8·6	
" 5	89	40	"	Bc.	4−2	8·5	
" 6	90	t.22	"	Ni.	4−5, 7+3·5	8·8	
" 11	95	24	2	Bo.	4−3, 5+3	8·7	
" 13	97	40	"	Th.	5−2	9·2	
" 14	0298	45	1	Br.	4−4, 6+1	8·7	
" 17	0301	T.50	"	Bn.	6−1, 7+2	9·0	
" 18	02	24	2	Bo.	6−3, 9+6	9·2	
" 18	02	40	"	Th.	=8	9·3	
" 23	07	30	1	Tn.	7−1·5, 9+5	9·3	
" 24	08	T.50	"	Bn.	7−5, 9+1·5	9·7	
" 26	10	24	2	Bo.	6−6, 9+3	9·5	
" 27	11	45	1	Br.	7−4, 9+3	9·6	
" 27	11	50	"	Ma.	9−1, 14+4	10·0	
" 28	12	79	"	"	9+1·5	9·7	
" 29	13	t.22	2	Ni.	9−3, 11+1	10·2	
" 29	13	60	1	Th.	=9	9·9	
July 3	17	"	2	"	=11	10·3	
" 3	17	30	1	Tn.	9−2, 11+2	10·1	
" 4	18	40	"	Bc.	14+2	10·2	
" 4	18	T.50	"	Bn.	9−2, 11+1	10·1	
" 6	20	79	"	Ma.	13+2·5, 14+2	10·4	
" 7	21	T.94	"	Ni.	9−2, 11+2	10·1	
" 9	23	30	2	Tn.	=14	10·4	
" 9	23	79	1	Ma.	14−2, 13+2	10·6	
" 12	26	"	"	"	11−5, 17+5	10·8	
" 14	28	T.95	"	Bn.	=13	10·8	
" 16	30	T.94	2	Ni.	14−4, 17+4	10·8	
" 20	34	79	1	Ma.	11−8, 17+1	11·1	
" 25	39	"	"	"	=17	11·3	
" 27	41	T.94	"	Ni.	17−4, 20+3·5, 21+3·5	11·9	
Aug. 2	47	183	"	Ma.	20+3	12·0	
" 3	48	160	"	Br.	17−6, 20+4	11·9	
" 10	55	T.94	"	Ni.	20+1, 21+2	12·2	
" 17	62	"	"	"	20−4, 21−4, 25+4	12·6	
" 17	62	60	2	Tn.	=21	12·4	
" 21	66	120	1	Br.	20−3, 27+3	12·6	
" 26	71	T.120	"	Bn.	21−3	12·7	
" 26	71	60	"	Tn.	=24	12·7	
" 26	71	157	2	Th.	28+4	12·5	
Sept. 11	87	120	"	Br.	20−4, 21−4	12·7	
" 11	87	T.150	1	Bn.	27+2	12·6	
" 15	91	157	3	Th.	27+4	12·4	
" 17	93	T.94	2	Ni.	=25	12·8	
" 19	95	60	"	Tn.	=27	12·8	
" 23	99	120	1	Br.	20−4, 27+2	12·7	
" 23	0399	T.94	2	Ni.	=25	12·8	
" 30	0406	157	3	Th.	20−5, 21−6	12·9	Doubtful.

(4511) T URSÆ MAJORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Oct. 11	0417	T.94	1	Ni.	20−6, 21−6, 25+2	12·8	
„ 21	27	157	2	Th.	21−3	12·7	
Nov. 7	44	„	3	„	20+4	11·9	
„ 10	47	160	1	Br.	17−2, 20+8	11·5	
„ 12	49	T.94	„	Ni.	17−2, 20+7	11·5	
„ 14	51	60	„	Tn.	=16	11·0	
„ 16	53	T.50	„	Bn.	11−2, 13+2	10·5	
„ 17	54	T.94	„	Ni.	9−3, 11+1·5	10·1	In t.22, 10·0.
„ 21	58	t.22	„	„	=9	9·9	
„ 26	63	60	2	Th.	5−3	9·3	
„ 27	64	„	1	Br.	6−1, 7+2	9·0	
„ 28	65	t.22	„	Ni.	4−7, 7+1·5	9·0	
„ 28	65	60	„	Tn.	6−2, 7+2	9·0	
„ 30	67	30	2	„	=5	9·0	
Dec. 1	68	t.22	1	Ni.	4−5, 7+3·5	8·8	
„ 1	68	40	„	Th.	=5	9·0	
„ 3	70	T.50	„	Bn.	4−2, (6+15)+2	8·5	
„ 5	72	„	„	„	2−2, =4	8·3	
„ 7	74	40	„	Bc.	4−3, 6+2	8·6	
„ 8	75	„	„	Th.	2−2, 4+2	8·2	
„ 12	79	„	„	Bc.	2−4, 4−1	8·4	
„ 14	81	60	„	Br.	2+2	7·8	
„ 16	83	T.50	„	Bn.	2+3	7·7	
„ 19	86	60	2	Th.	2+4	7·6	
„ 21	88	t.22	1	Ni.	0−1, 2+6	7·4	
„ 24	91	„	„	„	=0	7·3	Yellowish white.
„ 26	93	30	2	Tn.	2+3	7·7	
„ 31	0498	60	1	Br.	2+5	7·5	

(4557) S URSÆ MAJORIS. (V. 2.)

H.D. 123961.

NOTES.

Star A = B.D. + 60° 1413, 8·34 m. Harvard.
Star D = B.D. + 62° 1252, 8·26 m. Harvard.

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Jan. 3	8675	t.22	1	Ni.	3−8, 6+1	8·4	
„ 10	82	45	„	Br.	6−2, 8+1	8·7	
„ 10	82	t.60	„	Bn.	6−1, 8+2·5	8·6	
„ 17	89	t.22	„	Ni.	8−1, 9+7	9·0	
„ 19	8691	t.60	„	Bn.	8−2	9·0	

(4557) S URSÆ MAJORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Jan. 20	8692	45	I	Br.	8−2	9·0	
„ 25	8697	T.50	„	Bn.	8−1, 9+8	8·9	
„ 30	8702	„	„	„	8−5, 9+3	9·4	
„ 30	02	t.22	„	Ni.	8−7, 9+2	9·5	
Feb. 2	05	50	„	Ma.	14+2·5	10·0	
„ 3	06	T.50	„	Bn.	8−8, 9+0·5	9·7	
„ 4	07	„	„	„	8−8, 9+1·5	9·6	
„ 8	11	t.60	„	„	9−1, 10+1	9·8	
„ 9	12	T.50	„	„	9−1, 10+0·5	9·8	
„ 9	12	T.94	„	Ni.	8÷8, 9+1·5	9·6	In t.22, 9·8.
„ 11	14	160	„	Br.	13+2	9·9	
„ 11	14	T.50	„	Bn.	11+0·5	9·9	
„ 15	18	„	„	„	=12, 13+0·5	10·0	
„ 18	21	T.94	„	Ni.	13−2, 16+3·5	10·3	
„ 21	24	45	„	Br.	13−5, 19+3	10·6	
„ 27	30	T.94	„	Ni.	16−0·5, 22+4	10·7	
„ 28	31	50	„	Ma.	13−4, 16+1	10·5	
Mar. 1	32	45	2	Br.	=19, 20+1	10·9	
„ 3	34	50	I	Ma.	13−4, =16	10·6	
„ 8	39	45	„	Br.	14−4, 19+2	10·7	
„ 13	44	T.94	„	Ni.	=22	11·1	
„ 13	44	79	2	Ma.	22+1	11·0	
„ 15	46	160	I	Br.	=19	10·9	
„ 16	47	T.120	„	Bn.	19−1, 22+1	11·0	
„ 19	50	79	2	Ma.	22+1	11·0	
„ 20	51	T.94	I	Ni.	=22, 26+4	11·1	
„ 25	56	79	2	Ma.	22−1	11·2	
„ 27	58	„	I	„	22−1	11·2	
„ 29	60	T.94	„	Ni.	22−3, 26+2·5	11·4	
„ 31	62	160	„	Br.	19−4, 26+2	11·4	
„ 31	62	T.120	„	Bn.	23−1	11·5	
Apr. 1	63	„	„	„	=23, =26	11·5	
„ 1	63	79	„	Ma.	=23	11·4	
„ 10	72	t.85	2	Bn.	22−3, 26+2	11·4	
„ 11	73	T.94	I	Ni.	22−4, 26+1	11·5	
„ 17	79	t.75	2	Bn.	22−2, 23+1	11·3	
„ 24	86	T.94	I	Ni.	16−1, 22+3	10·8	
„ 25	87	160	2	Br.	=19	10·9	
May 2	94	T.94	I	Ni.	=13	10·1	
„ 5	97	T.50	2	Bn.	8−8, 9+0·5	9·7	
„ 7	8799	45	I	Br.	8−2	9·0	
„ 12	8804	t.60	„	Bn.	8−1·5	9·0	
„ 12	04	t.22	„	Ni.	8−4, 9+4	9·3	
„ 14	06	t.75	„	Bn.	8+0·5	8·8	
„ 18	10	60	„	Br.	6+3, 8+6	8·2	
„ 22	14	t.22	„	Ni.	6−2, 8+1·5	8·7	
„ 22	14	t.60	„	Bn.	6+1	8·4	
„ 26	18	t.30	„	„	5−14, 3−9, 6+1, 8+1·5	8·5	
„ 29	8821	60	„	Br.	6+3	8·2	

(4557) S URSÆ MAJORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
June 2	8825	t.30	2	Bn.	6+2	8·3	
,, 3	26	T.50	1	,,	3−9, 6+1, 8+3	8·4	
,, 5	28	t.22	,,	Ni.	=6	8·5	
,, 8	31	t.30	,,	Bn.	3−8, 6+1·5	8·3	
,, 13	36	60	,,	Br.	3−6, 6+4	8·1	
,, 13	36	50	,,	Ma.	6+1	8·4	
,, 14	37	T.50	,,	Bn.	5−13, 3−8, 6+1·5, 8+2	8·5	
,, 17	40	50	,,	Ma.	5−11, 6+1	8·4	
,, 19	42	T.50	,,	Bn.	5−12, 3−9, 6+1, 8+2	8·5	
,, 24	47	50	,,	Ma.	2−13, 6+1	8·4	
,, 26	49	t.22	,,	Ni.	6+1·5	8·4	
July 3	56	t.30	,,	Bn.	5−13, 3−8, 6+1·5, 8+2	8·5	
,, 4	57	60	,,	Br.	6+4	8·1	
,, 7	60	t.22	,,	Ni.	3−9, 6+1	8·4	
,, 11	64	T.50	,,	Bn.	6+2	8·3	
,, 11	64	50	,,	Ma.	2−12, 6+2	8·3	
,, 16	69	t.22	,,	Ni.	3−7, 6+2·5	8·2	Orange yellow.
,, 22	75	T.50	,,	Bn.	5−10, 3−7, 6+2, 8+5	8·3	
,, 22	75	50	,,	Ma.	2−7, 6+7	7·8	
,, 27	80	t.22	,,	Ni.	3−6, 6+4	8·1	Orange yellow.
,, 29	82	t.60	2	Bn.	5−5, 8+10	7·8	
,, 31	84	60	1	Br.	3−1	7·6	
Aug. 2	86	50	,,	Ma.	5−6, 6+6	7·9	Ruddy.
,, 6	90	t.60	,,	Bn.	5−9, 3−10, 6+2, 8+3	8·4	
,, 7	91	50	,,	Ma.	2−12, 6+2	8·3	
,, 9	93	t.22	,,	Ni.	3−6·5, 6+3	8·2	
,, 9	93	45	,,	Br.	3−5, 6+5	8·0	
,, 10	94	t.60	,,	Bn.	3−8, 5−11, 6+2, 8+3	8·4	
,, 10	94	50	,,	Ma.	2−7, 6+7	7·8	Very red.
,, 12	96	,,	,,	,,	5−4, 6+8	7·7	
,, 15	99	34	2	Cr.	3−3, 6+7	7·8	
,, 15	8899	50	,,	Ma.	5−7, 6+5	8·0	
,, 19	8903	,,	,,	,,	5−4, 6+8	7·7	
,, 19	03	p.26	1	Bn.	5−12, 3−8, 6+1, 8+2	8·5	p.=2″ O.G.
,, 19	03	t.22	,,	Ni.	3−7, 6+2	8·3	
,, 21	05	34	2	Cr.	3−5, 6+5	8·0	
,, 22	06	45	1	Br.	3−5, 6+5	8·0	
,, 24	08	34	2	Cr.	3−7, 6+3	8·2	
,, 26	10	50	1	Ma.	=6	8·5	
,, 31	15	45	,,	Br.	6+3, 8+6	8·2	
Sept. 1	16	t.22	,,	Ni.	6−2, 8+1	8·7	
,, 3	18	t.75	,,	Bn.	8−2, 9+6	9·1	
,, 8	23	45	,,	Br.	6−2, 8+1	8·7	
,, 12	27	t.60	,,	Bn.	8−6, 9+2	9·5	
,, 17	32	45	,,	Br.	8−1	8·9	
,, 20	35	t.22	,,	Ni.	8−7, 9+1	9·6	
,, 25	40	T.94	2	,,	9−1	9·8	
,, 27	8942	T.50	1	Bn.	11−1, =13, 14+1	10·1	

(4557) S URSÆ MAJORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Oct. 6	8951	T.94	1	Ni.	13−4, 16+1·5	10·5	
„ 14	59	„	„	„	=22	11·1	
„ 14	59	160	„	Br.	19−1, 22+1	11·0	
„ 23	68	T.94	„	Ni.	22−1, 26+4	11·2	
Nov. 1	77	T.95	„	Bn.	23−1, 26+1	11·5	
„ 5	81	T.94	„	Ni.	22−3, 26+2	11·4	
„ 6	82	160	„	Br.	26+1	11·5	
„ 14	90	T.94	2	Ni.	22−4, 26+1	11·5	
„ 15	91	160	„	Br.	=26	11·6	
„ 20	96	T.120	1	Bn.	22−4, =26	11·5	
„ 23	8999	T.94	„	Ni.	22−1, 26+4	11·2	
„ 29	9005	160	„	Br.	22−2, 26+3	11·3	
Dec. 4	10	T.94	2	Ni.	16−3, 22+1·5	10·9	
„ 13	19	„	1	„	9−2, 13+1	10·0	
„ 19	25	60	„	Br.	13+2	9·9	
„ 19	25	T.50	„	Bn.	14−2, 19+4·5	10·5	
„ 22	28	„	„	„	9−1, 10+0·5	9·8	
„ 24	30	t.60	„	„	9−0·5, 10+1	9·8	
„ 27	33	„	„	„	8−8, =9	9·7	
„ 27	33	t.22	„	Ni.	8−7, 9+2	9·5	
„ 30	36	t.60	„	Bn.	8−8, 9+1	9·6	
1911.							
Jan. 1	38	„	„	„	8−6, 9+2	9·5	
„ 1	38	45	„	Br.	8−1	8·9	
„ 6	43	t.60	„	Bn.	8−2, 9+6	9·1	
„ 9	46	„	„	„	8−2·5, 9+6	9·1	
„ 9	46	t.22	„	Ni.	8−4, 9+4	9·3	
„ 15	52	t.60	„	Bn.	8−2	9·0	
„ 16	53	45	„	Br.	6−2, 8+1	8·7	
„ 28	65	„	„	„	=6	8·5	
„ 28	65	t.30	„	Bn.	6−2·5, 8+1	8·7	
„ 29	66	t.22	„	Ni.	=8	8·8	
„ 31	68	T.50	„	Bn.	6−1, 8+2·5	8·6	
Feb. 8	76	t.22	„	Ni.	6−2, 8+2	8·7	
„ 11	79	45	„	Br.	6+4	8·1	
„ 19	87	t.22	„	Ni.	3−8, 6+1	8·4	
„ 19	87	t.30	„	Bn.	6+3	8·2	
„ 22	90	45	„	Br.	3−6, 6+4	8·1	
„ 25	93	T.50	„	Bn.	5−7, 6+5	8·0	
„ 26	94	t.22	„	Ni.	3−8, 6+2	8·3	Yellow.
Mar. 2	9098	T.25	„	Bn.	3−2, 5−2·5, 6+10	7·6	
„ 4	9100	45	„	Br.	6+5	8·0	
„ 5	01	t.22	„	Ni.	3−5, 6+4·5	8·0	Yellow.
„ 7	03	t.30	„	Bn.	=5	7·3	
„ 9	05	T.25	„	„	5−2	7·5	
„ 14	10	T.50	„	„	5+1	7·2	
„ 19	15	t.30	2	„	5−2	7·5	
„ 19	15	t.22	1	Ni.	3−3, A+4·5	7·9	
„ 21	17	T.50	„	Bn.	5−1·5	7·5	
„ 25	9121	„	2	„	5−5, 6+7	7·8	

(4557) S URSÆ MAJORIS—*continued*.

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
Mar. 29	9125	t.22	1	Ni.	=A	8·3	
,, 31	27	,,	,,	,,	6+0·5	8·5	
,, 31	27	T.50	,,	Bn.	5−9, 6+3	8·2	
Apr. 3	30	,,	,,	,,	6+3	8·2	
,, 5	32	t.22	,,	Ni.	6+1	8·4	
,, 11	38	45	,,	Br.	6+5, 8+8	8·0	
,, 15	42	t.22	,,	Ni.	6−2, 8+2	8·7	
,, 15	42	t.60	,,	Bn.	6+1	8·4	
,, 26	53	,,	,,	,,	8−4, 9+4	9·3	
,, 26	53	45	,,	Br.	=6	8·5	
,, 28	55	t.22	,,	Ni.	8−5·5, 9+3	9·4	
May 4	61	T.50	,,	Bn.	8−7, 9+2·5	9·5	
,, 6	63	T.94	,,	Ni.	8−6, 9+2	9·5	In t.22, 9·9.
,, 9	66	160	2	Br.	13+2	9·9	
,, 10	67	T.50	1	Bn.	9+1	9·6	
,, 15	72	T.94	,,	Ni.	=13	10·1	
,, 21	78	160	,,	Br.	19+1	10·8	
,, 22	79	T.50	,,	Bn.	19−1, 22+0·5	11·0	
,, 26	83	T.94	,,	Ni.	16−4, 22+1	11·0	
,, 27	84	T.120	,,	Bn.	22−1, 23+2·5	11·2	
June 4	92	T.94	,,	Ni.	22−1	11·2	
,, 6	9194	T.120	,,	Bn.	22−4, 26+1	11·5	
,, 17	9205	T.94	,,	Ni.	22−3, 26+2	11·4	
,, 18	06	160	,,	Br.	=26	11·6	
,, 20	08	34	,,	Cr.	<22	<11·1	Glimpsed.
July 2	20	T.94	,,	Ni.	26−2	11·8	
,, 5	23	T.120	2	Bn.	26−3	11·9	
,, 10	28	T.94	1	Ni.	=26	11·6	
,, 15	33	T.120	,,	Bn.	22−3, 26+1	11·4	
,, 19	37	T.94	,,	Ni.	22−2, 26+3	11·3	
,, 21	39	160	,,	Br.	19+2	10·7	
,, 22	40	T.120	,,	Bn.	22−2·5, 23+1	11·3	
,, 27	45	,,	,,	,,	19−1, 22+1	11·0	
,, 30	48	T.94	,,	Ni.	=13	10·1	
Aug. 1	50	45	,,	Br.	13−5, 19+3	10·6	
,, 1	50	T.95	,,	Bn.	14−2, 19+3·5	10·5	
,, 6	55	T.94	,,	Ni.	9+2	9·5	In t.22, 9·7.
,, 17	66	t.22	,,	,,	8−5, 9+3	9·4	
,, 18	67	34	,,	Cr.	=6	8·5	
,, 24	73	45	,,	Br.	6−1, 8+2	8·6	
,, 27	76	t.22	,,	Ni.	8−2, 9+7	9·0	
Sept. 6	86	60	,,	Br.	6−1, 8+2	8·6	
,, 14	9294	,,	,,	,,	6−1, 8+2	8·6	
,, 22	9302	t.22	,,	Ni.	=8	8·8	
,, 26	06	34	,,	Cr.	=6	8·5	
,, 28	08	t.22	,,	Ni.	6−2, 8+1	8·7	
Oct. 1	11	T.50	,,	Bn.	3−8, 6+1·5	8·3	
,, 8	18	t.22	,,	Ni.	3−8, 6+2	8·3	
,, 10	9320	60	,,	Br.	3−5, 6+5	8·0	

(4557) S URSÆ MAJORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
Oct. 16	9326	t.22	1	Ni.	3−7, 6+3	8·2	
,, 21	31	T.50	,,	Bn.	3−6, 6+4	8·1	
,, 26	36	t.30	,,	,,	5−9, 3−5, 6+5, 8+6	8·1	
,, 26	36	t.22	,,	Ni.	3−6, 6+3	8·2	
,, 27	37	60	2	Br.	3−4, 6+6	7·9	
,, 28	38	T.50	1	Bn.	5−10, 3−6, 6+4, 8+5	8·2	
Nov. 5	46	t.22	,,	Ni.	3−6, 6+4	8·1	
,, 6	47	T.50	,,	Bn.	5−4, 3−1, 6+8, 8+11	7·7	
,, 12	53	t.30	,,	,,	5−4, 3−2, 6+7, 8+11·5	7·7	
,, 17	58	45	,,	Br.	3−6, 6+4	8·1	
,, 21	62	t.22	,,	Ni.	6−0·5, 8+2	8·6	
,, 29	70	T.50	,,	Bn.	6+1	8·4	
Dec. 3	74	45	,,	Br.	=6	8·5	
,, 4	75	t.22	2	Ni.	=8	8·8	
,, 7	78	T.50	1	Bn.	8−2	9·0	
,, 11	82	t.22	,,	Ni.	8−6, 9+3	9·4	
,, 15	86	45	,,	Br.	8−5, 13+7	9·4	
,, 17	88	t.22	,,	Ni.	8−6·5, 9+2	9·5	
,, 20	91	T.50	,,	Bn.	8−8, 9+1·5	9·6	
,, 24	9395	t.22	,,	Ni.	=9	9·7	
1912.							
Jan. 5	9407	160	,,	Br.	=19	10·9	
,, 7	09	T.94	,,	Ni.	13−4, 16+2	10·5	
,, 14	16	,,	,,	,,	16−2, 22+2	10·9	
,, 26	28	,,	,,	,,	22−1, 26+4	11·2	
,, 26	28	T.95	,,	Bn.	23−0·5, 26+1	11·5	
Feb. 1	34	160	,,	Br.	22−2, 26+2	11·3	
,, 2	35	T.94	,,	Ni.	22−3, 26+2	11·4	
,, 7	40	,,	,,	,,	22−2, 26+2·5	11·3	
,, 12	45	40	3	La.	=22	11·1	
,, 19	52	160	1	Br.	19−1, =22	11·1	
,, 21	54	T.94	2	Ni.	22−0·5, 26+4	11·2	
Mar. 3	65	,,	1	,,	13−2, 16+3	10·3	
,, 3	65	T.50	,,	Bn.	=11	10·0	
,, 5	67	40	,,	La.	13−2, 16+4	10·3	
,, 6	68	,,	,,	,,	13−3, 16+3	10·4	
,, 6	68	45	,,	Br.	13−1	10·2	
,, 8	70	40	2	La.	13−2, 16+4	10·3	
,, 12	74	,,	1	,,	9−2, 13+2	9·9	
,, 13	75	,,	,,	,,	=9	9·7	
,, 14	76	,,	,,	,,	8−7, 9+2	9·5	
,, 19	81	20	,,	,,	8−6, 9+3	9·4	
,, 19	81	t.22	,,	Ni.	8−5·5, 9+4	9·4	
,, 20	82	45	,,	Br.	8−2, 9+6	9·1	
,, 23	85	20	2	La.	8−4, 9+4	9·3	
,, 26	88	40	1	,,	6−1, 8+2	8·6	
,, 29	91	,,	,,	,,	=6	8·5	
,, 30	9492	t.22	,,	Ni.	6−2, 8+1	8·7	

(4557) S URSÆ MAJORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Apr. 3	9496	T.50	1	Bn.	5−11, 6+2	8·4	
,, 3	96	40	2	La.	=8	8·8	
,, 6	9499	20	1	,,	6−2, 8+1	8·7	
,, 9	9502	t.22	,,	Ni.	=6	8·5	
,, 10	03	20	,,	La.	=6	8·5	
,, 14	07	45	,,	Br.	6+1	8·4	
,, 20	13	t.22	,,	Ni.	3−8·5, 6+1	8·4	
,, 23	16	38	2	Gd.	6+2	8·3	
,, 23	16	20	1	La.	6+2	8·3	
,, 24	17	40	,,	,,	3−8, 6+2	8·3	
,, 26	19	20	2	,,	6+2	8·3	
,, 26	19	t.22	1	Ni.	3−8·5, 6+1	8·4	
,, 29	22	t.30	,,	Bn.	3−6·5, 6+3	8·2	
May 8	31	40	,,	La.	6+3	8·2	
,, 10	33	t.22	,,	Ni.	3−8, 6+2·5	8·3	
,, 11	34	40	,,	Gi.	3−3, 5−3, 6+4	7·8	
,, 15	38	,,	,,	,,	3−4, 6+3·5	8·0	
,, 17	40	t.22	,,	Ni.	3−6·5, 6+3	8·2	
,, 17	40	T.50	,,	Bn.	3−6·5, 6+3	8·2	
,, 18	41	45	,,	Br.	3−7, 6+3	8·2	
,, 20	43	40	,,	Gi.	3−6, 6+4	8·1	
,, 25	48	t.22	,,	Ni.	3−8, 6+2·5	8·3	Orange yellow.
,, 26	49	20	2	La.	3−3, 6+6·5	7·8	
,, 31	54	,,	,,	,,	3−5, 6+5	8·0	
June 2	56	40	1	Gi.	3−5, 6+6	8·0	
,, 2	56	T.25	,,	Bn.	5−11, 3−6·5, 6+3, 8+3	8·3	
,, 4	58	20	,,	La.	3−7, 6+3	8·2	
,, 6	60	45	,,	Br.	3−4, 6+6	7·9	
,, 7	61	40	,,	Gi.	3−4, 6+6	7·9	
,, 7	61	t.22	,,	Ni.	3−7, 6+3	8·2	
,, 8	62	20	,,	La.	3−8, 6+2	8·3	
,, 10	64	t.30	,,	Bn.	5−11, 3−6·5, 6+3, 8+3	8·3	
,, 13	67	T.25	,,	,,	5−10, 3−7, 6+2, 8+5	8·3	
,, 14	68	40	,,	Gi.	3−5, D+2·5, 6+5	8·0	
,, 18	72	t.22	,,	Ni.	=6	8·5	Orange yellow.
,, 19	73	20	,,	La.	6+1	8·4	
,, 21	75	t.30	,,	Bn.	5−12, 3−7, 6+2, 8+3	8·4	
,, 23	77	45	,,	Br.	6+3, 8+6	8·2	
,, 25	79	40	,,	Gi.	D+1, 6+2·5	8·2	
,, 30	84	20	,,	La.	6−2, 8+2	8·7	
July 5	89	40	,,	,,	6−2, 8+1	8·7	
,, 5	89	t.22	,,	Ni.	=8	8·8	
,, 8	92	40	,,	Gi.	6−1, 8+2	8·6	
,, 11	95	T.50	,,	Bn.	6−2, =8	8·8	
,, 12	96	t.22	,,	Ni.	8−7·5, 9+1	9·6	
,, 14	98	T.50	,,	Bn.	8−2	9·0	
,, 15	9599	40	2	La.	8−3, 9+6	9·1	
,, 17	9601	,,	1	Gi.	6−2, 8+0·5	8·7	
,, 18	02	45	,,	Br.	8−1	8·9	
,, 18	02	40	,,	La.	8−4	9·2	
,, 23	9607	T.94	2	Ni.	8−7, 9+3	9·5	

(4557) S URSÆ MAJORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
July 30	9614	T.94	1	Ni.	8−7, 9+2	9·5	
„ 30	14	T.95	„	Bn.	=11	10·0	
„ 31	15	40	„	Gi.	8−3, 9+1	9·4	
Aug. 5	20	„	2	La.	=13	10·1	
„ 9	24	„	1	„	=19	10·9	
„ 9	24	T.94	„	Ni.	=13	10·1	
„ 12	27	40	„	Gi.	13−4, 16+1	10·5	
„ 18	33	„	„	„	=16	10·7	
„ 19	34	T.94	„	Ni.	=16	10·7	
Sept. 2	48	160	„	Br.	22−3, 26+2	11·4	
„ 2	48	T.120	„	Bn.	=23, =26	11·5	
„ 4	50	T.94	„	Ni.	22−3, 26+2	11·4	
„ 7	53	40	2	Gi.	=26	11·6	
„ 11	57	T.94	1	Ni.	22−3, 26+1·5	11·4	
„ 17	63	160	„	Br.	26−2, 28+2	11·8	
„ 20	66	T.94	„	Ni.	22−4, 26+1	11·5	
Oct. 2	78	„	2	„	22−3·5, 26+1	11·5	
„ 2	78	T.120	1	Bn.	28−2	12·1	Doubtful. [C.L.B.]
„ 8	84	T.94	„	Ni.	22−3, 26+2	11·4	
„ 10	86	160	2	Br.	=22	11·1	
„ 11	87	40	3	Gi.	22−1	11·2	
„ 14	90	„	2	„	16−2, 22+1	10·9	
„ 14	90	„	„	La.	=16	10·7	
„ 14	90	T.94	1	Ni.	13−5, 16+1	10·6	
„ 17	9693	40	3	La.	13−3, 16+3	10·4	
„ 28	9704	„	1	„	8−3	9·1	
„ 29	05	160	„	Br.	8−2, 9+6	9·1	
„ 29	05	40	2	Hw.	8−3, 9+6·5	9·1	
„ 31	07	T.94	1	Ni.	8−3, 9+6	9·1	In t.22, 9·2.
Nov. 1	08	40	„	Gi.	=8	8·8	
„ 7	14	„	„	La.	6−1, 8+2	8·6	
„ 9	16	20	2	„	6−2, 8+0·5	8·7	
„ 11	18	45	1	Br.	=6	8·5	
„ 12	19	40	2	Hw.	=6	8·5	
„ 13	20	20	1	La.	6−0·5, 8+2	8·6	
„ 20	27	t.22	„	Ni.	6−2, 8+1	8·7	
„ 25	32	40	„	La.	=6	8·5	
„ 25	32	„	2	Gi.	3−6, D−2, 6+1·5	8·3	
„ 27	34	T.50	1	Bn.	6−2, 8+2	8·7	
„ 30	37	„	„	„	6−2·5, 8+1	8·7	
„ 30	37	40	2	Hw.	2−10, 6+4	8·1	
Dec. 3	40	20	1	La.	6+1	8·4	
„ 3	40	40	„	Gi.	3−7, 6+2	8·3	
„ 4	41	t.22	2	Ni.	6−2, =8	8·8	
„ 4	41	45	1	Br.	6+1	8·4	
„ 5	42	20	„	La.	6+2	8·3	
„ 7	44	„	„	„	6+3	8·2	
„ 9	46	40	„	Gi.	3−8, 6+2·5	8·3	
„ 11	48	20	2	La.	6+2	8·3	
„ 12	9749	40	„	Hw.	2−12, 6+3	8·2	

(4557) S URSÆ MAJORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Dec. 12	9749	t.22	1	Ni.	6−3, 8+0·5	8·8	
„ 12	49	t.30	„	Bn.	5−13, 3−9, 6+1, 8+2	8·5	
„ 18	55	T.50	„	„	5−9, 6+2	8·3	
„ 20	57	t.22	„	Ni.	6+0·5	8·5	
„ 20	57	40	2	Gi.	6+3	8·2	
„ 23	60	45	1	Br.	6+5	8·0	
„ 29	66	T.50	„	Bn.	5−12, 3−8, 6+1, 8+3	8·4	
1913.							
Jan. 1	69	t.30	„	„	5−12, 3−8, 6+2, 8+3·5	8·4	
„ 2	70	45	„	Br.	3−6, 6+4	8·1	
„ 3	71	t.22	„	Ni.	6+0·5	8·5	
„ 5	73	T.50	„	Bn.	5−10, 6+3, 8+5	8·3	
„ 6	74	40	„	Gi.	3−6, 6+4	8·1	
„ 12	80	20	„	La.	6+2	8·3	
„ 12	80	t.30	„	Bn.	5−9, 3−10, 6+3, 8+2	8·4	
„ 12	80	40	„	Gi.	3−6, 6+3·5	8·1	
„ 15	83	t.22	„	Ni.	3−8, 6+2	8·3	
„ 18	86	45	„	Br.	3−3, 5−5	7·8	
„ 26	94	T.50	„	Bn.	5−3, 3−2, 6+7, 8+12	7·7	
„ 31	9799	t.22	„	Ni.	3−8, 6+2	8·3	
Feb. 2	9801	t.30	„	Bn.	5−10, 3−7, 6+2, 8+5	8·3	
„ 3	02	40	„	Gi.	e−2·5, 6+3	8·2	
„ 5	04	45	„	Br.	3−4, 6+6	7·9	
„ 8	07	T.50	„	Bn.	5−11, 3−8, 6+2, 8+3	8·4	
„ 8	07	t.22	„	Ni.	=6	8·5	
„ 10	09	40	„	La.	=6	8·5	
„ 13	12	20	„	„	=6	8·5	
„ 15	14	40	„	„	6+1	8·4	
„ 15	14	„	„	Gi.	e−4, 6+2	8·3	
„ 16	15	„	2	La.	6+3	8·2	
„ 17	16	t.22	1	Ni.	6−2·5, 8+1	8·7	
„ 19	18	T.50	„	Bn.	5−12, 3−8, 6+1, 8+3	8·4	
„ 23	22	40	2	La.	6−1, 8+2	8·6	
„ 25	24	t.22	1	Ni.	=8	8·8	
„ 25	24	45	„	Br.	6−2, 8+1	8·7	
Mar. 2	29	20	„	La.	6−2·5, 8+1	8·7	
„ 5	32	40	„	„	8−2, 9+7	9·0	
„ 8	35	T.50	„	Bn.	8−1	8·9	
„ 8	35	t.22	„	Ni.	8−6, 9+3	9·4	
„ 11	38	40	„	Gi.	=h	9·2	
„ 11	38	45	„	Br.	8−5, 9+4	9·3	
„ 19	46	40	„	La.	8−6, 9+3	9·4	
„ 19	46	T.94	„	Ni.	8−4, 9+4	9·3	
„ 28	55	60	„	Br.	13−2, 19+6	10·3	
„ 28	55	T.50	„	Bn.	12−1, =14	10·2	
„ 30	57	40	„	La.	=16, 19+2	10·7	
Apr. 2	60	T.94	„	Ni.	13−3, 16+3	10·4	
„ 9	67	„	„	„	16−2, 22+3	10·8	
„ 16	74	40	3	La.	=19	10·9	
„ 22	80	T.94	1	Ni.	22−2, 26+3	11·3	
„ 25	9883	160	„	Br.	22−2, 26+2	11·3	

(4557) S URSÆ MAJORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Apr. 28	9886	T.94	1	Ni.	22−2, 26+3	11·3	
,, 28	86	40	,,	La.	22−2	11·3	
May 5	93	T.95	2	Bn.	28−2	12·1	
,, 6	94	,,	1	,,	28−2, 30+4	12·1	
,, 7	95	40	,,	La.	22−3·5, 26+1	11·5	
,, 9	97	160	,,	Br.	22−3, 26+2	11·4	
,, 11	9899	T.94	,,	Ni.	22−3, 26+2	11·4	
,, 12	9900	40	2	Gi.	=26	11·6	
,, 13	01	T.95	,,	Bn.	=28	11·9	About.
,, 17	05	160	1	Br.	22−3, 26+1	11·4	
,, 21	09	40	,,	La.	=16, =17	10·6	
,, 22	10	T.94	,,	Ni.	22−2, 26+3	11·3	
,, 24	12	40	2	La.	16−4, =22	11·1	
,, 25	13	50	1	Ma.	22−0·5	11·1	
,, 25	13	T.95	,,	Bn.	22−0·5	11·1	
,, 27	15	160	,,	Br.	=22	11·1	
,, 28	16	40	,,	La.	16−4, =22	11·1	
,, 29	17	,,	,,	Gi.	=22	11·1	
,, 30	18	T.50	,,	Bn.	19−1	11·0	
,, 31	19	79	,,	Ma.	16+0·5	10·6	
,, 31	19	24	2	Bo.	=18	10·8	
June 1	20	40	,,	La.	16−2, 22+2	10·9	
,, 2	21	T.94	1	Ni.	13−3, 16+2	10·4	
,, 3	22	t.85	,,	Bn.	14−5, 19+1·5	10·8	
,, 3	22	79	,,	Ma.	13−6, 22+4	10·7	
,, 4	23	T.50	,,	Bn.	14−4·5, 19+2	10·7	
,, 4	23	24	2	Bo.	=16, =17	10·6	
,, 6	25	60	1	Br.	13−1	10·2	
,, 7	26	79	,,	Ma.	13−3, 16+3	10·4	
,, 7	26	34	2	Cr.	13−2	10·3	
,, 8	27	40	1	Gi.	13−2, 16+2	10·4	
,, 8	27	,,	,,	La.	13−2, 16+4	10·3	
,, 10	29	,,	,,	,,	9−1, 13+2	9·9	
,, 10	29	79	,,	Ma.	13+0·5	10·0	
,, 11	30	40	2	Gi.	h−3, 9+1·5	9·6	
,, 12	31	,,	1	La.	8−7, =9, 13+4	9·7	
,, 14	33	T.94	,,	Ni.	8−6, 9+2·5	9·5	In t.22, 9·5.
,, 14	33	24	,,	Bo.	8−2, 9+6	9·1	
,, 15	34	T.50	,,	Bn.	=10, 14+3	9·9	
,, 15	34	34	2	Cr.	8−3	9·1	
,, 16	35	79	1	Ma.	13+2	9·9	
,, 17	36	34	,,	Cr.	=8	8·8	
,, 19	38	24	,,	Bo.	8−2, 9+6	9·1	
,, 21	40	40	,,	La.	8−4, 9+4	9·3	
,, 23	42	T.50	,,	Bn.	8−7, 9+1·5	9·6	
,, 27	46	50	,,	Ma.	8−1·5	9·0	
,, 29	48	T.50	,,	Bn.	8+1	8·7	
,, 29	48	34	,,	Cr.	=6	8·5	
,, 30	49	24	,,	Bo.	=8	8·8	
July 3	52	t.60	,,	Bn.	=8	8·8	
,, 8	57	t.22	,,	Ni.	6−3, 8+1	8·8	
,, 11	60	t.30	,,	Bn.	8+2	8·6	
,, 12	9961	t.22	,,	Ni.	=6	8·5	

(4557) S URSÆ MAJORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
July 12	9961	20	1	La.	3−8, 6+2	8·3	
,, 13	62	50	,,	Ma.	6+0·5	8·5	
,, 20	69	T.50	,,	Bn.	6+2	8·3	
,, 24	73	15	2	Bo.	5−9, 6+3	8·2	
,, 26	75	40	1	La.	=6, 8+3	8·5	
,, 29	78	T.50	,,	Bn.	3−10, 5−9, 6+3, 8+3	8·4	
,, 31	80	15	,,	Bo.	5−4, 6+8	7·7	
Aug. 1	81	45	,,	Br.	3−6, 6+4	8·1	
,, 1	81	50	,,	Ma.	2−10, 6+5	8·0	
,, 2	82	34	2	Cr.	3−2, 5−3	7·7	
,, 12	92	t.22	1	Ni.	3−7, 6+3	8·2	
,, 17	9997	15	2	Bo.	5−3, 6+9	7·6	
,, 20	0000	,,	1	,,	5−3, 6+9	7·6	
,, 22	02	t.22	,,	Ni.	3−8, 6+2	8·3	
,, 23	03	20	2	La.	3−5, 6+5	8·0	
,, 24	04	45	1	Br.	3−4, 6+6	7·9	
,, 27	07	15	,,	Bo.	5−2, 6+9·5	7·5	
,, 29	09	T.50	,,	Bn.	5−9, 6+3	8·2	
Sept. 3	14	50	,,	Ma.	5−9, 6+3	8·2	
,, 4	15	t.22	,,	Ni.	3−8, 6+1	8·4	
,, 6	17	t.30	,,	Bn.	3−10, 5−10, 6+2, 8+3·5	8·4	
,, 7	18	45	,,	Br.	3−6, 6+4	8·1	
,, 7	18	50	2	Ma.	2−12, 6+3	8·2	
,, 8	19	24	1	Bo.	5−4, 6+8	7·7	
,, 8	19	40	,,	Hw.	2−10, 6+4	8·1	
,, 10	21	t.22	,,	Ni.	6+0·5	8·5	
,, 11	22	24	,,	Bo.	5−6, 6+6	7·9	
,, 18	29	T.50	,,	Bn.	6+1, 8+4	8·4	
,, 20	31	24	,,	Bo.	5−8, 6+4	8·1	
,, 21	32	t.22	,,	Ni.	6−2, 8+2	8·7	
,, 24	35	45	,,	Br.	6+1	8·4	
,, 24	35	20	,,	La.	=6, 8+2	8·6	
,, 24	35	24	,,	Bo.	5−9, 6+2	8·3	
,, 27	38	t.22	,,	Ni.	6−2, 8+1·5	8·7	
,, 27	38	24	,,	Bo.	5−9, 6+2	8·3	
,, 28	39	T.50	,,	Bn.	6+1	8·4	
Oct. 4	45	24	2	Bo.	6−0·5, 8+2	8·6	
,, 12	53	,,	,,	,,	6−2·5, 8+1	8·7	
,, 16	57	40	,,	Hw.	6−8, 8−5	9·3	
,, 17	58	45	,,	Br.	8−1	8·9	
,, 17	58	T.94	,,	Ni.	8−3·5, 9+6	9·2	In t.22, 9·4.
,, 21	62	20	1	La.	8−3, 9+6	9·1	
,, 22	63	40	2	Hw.	8−2, 9+7	9·0	
,, 25	66	,,	1	La.	8−3, 9+6	9·1	
,, 25	66	24	2	Bo.	8−4, 9+4	9·3	
,, 28	69	T.94	1	Ni.	9−1·5, 13+2	9·9	
Nov. 1	73	79	,,	Ma.	14+2	10·1	
,, 1	73	45	,,	Br.	=13	10·1	
,, 1	73	24	,,	Bo.	8−7·5, 9+2	9·6	
,, 18	90	40	2	La.	13−4, 17+2	10·5	
,, 19	0091	24	,,	Bo.	=20	11·0	

(4557) S URSÆ MAJORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Nov. 22	0094	T.94	I	Ni.	16−2, 22+2	10·9	
„ 22	94	160	„	Br.	=19	10·9	
„ 22	94	T.95	„	Bn.	19−1, 22+1	11·0	
„ 26	0098	40	2	La.	13−4, 17+1·5	10·5	
„ 29	0101	90	3	Hw.	13−7, 16−1·5	10·8	
Dec. 4	06	160	I	Br.	19−1, 22+1	11·0	
„ 5	07	40	„	La.	13−5, =17, 22+5	10·6	
„ 7	09	T.94	„	Ni.	16−2, 22+2	10·9	
„ 18	20	„	„	„	13−5, 16+1	10·6	
„ 18	20	T.95	„	Bn.	19−1, 22+1	11·0	
„ 21	23	40	„	La.	=17, 22+4	10·7	
„ 24	26	160	„	Br.	19−1, 22+1	11·0	
„ 24	26	T.94	„	Ni.	=16	10·7	
„ 30	32	„	„	„	13−4·5, 16+1	10·5	
1914.							
Jan. 2	35	45	„	Br.	13−6, 19+3	10·7	
„ 2	35	40	„	La.	13−1·5, 17+4	10·2	
„ 3	36	T.50	„	Bn.	13−1, 14+0·5	10·2	
„ 6	39	T.95	„	„	=12, =13	10·1	
„ 11	44	T.94	„	Ni.	=8	8·8	In t.22, 9·2.
„ 16	49	24	2	Bo.	8−1, 9+8	8·9	
„ 17	50	40	„	Hw.	6−5, 8−1·5	9·0	
„ 17	50	t.22	I	Ni.	8−4, 9+5	9·2	
„ 23	56	45	„	Br.	8−3, 9+6	9·1	
„ 24	57	24	„	Bo.	=8	8·8	
„ 24	57	40	„	La.	8−2, 9+7·5	9·0	
„ 26	59	T.50	„	Bn.	=8	8·8	
„ 31	64	24	2	Bo.	6−2, 8+2	8·7	
Feb. 1	65	t.22	I	Ni.	6−2, 8+2	8·7	
„ 2	66	40	„	Hw.	2−12, 6+3	8·2	
„ 2	66	„	„	La.	=6, 8+3	8·5	
„ 3	67	24	„	Bo.	5−10, 6+1	8·4	
„ 6	70	40	2	La.	6+1	8·4	
„ 10	74	24	I	Bo.	5−9, 6+3	8·2	
„ 12	76	t.22	„	Ni.	3−9, 6+1·5	8·4	
„ 15	79	T.50	„	Bn.	5−11, 3−8, 6+1·5, 8+3	8·4	
„ 17	81	24	„	Bo.	5−8, 6+4	8·1	
„ 17	81	40	„	La.	=6, 8+3	8·5	
„ 18	82	45	„	Br.	6+3, 8+6	8·2	
„ 18	82	T.50	„	Bn.	5−9, 6+3	8·2	
„ 21	85	t.22	„	Ni.	3−9, 6+1	8·4	
„ 22	86	T.50	„	Bn.	5−11, 3−8, 6+1·5, 8+3	8·4	
„ 23	87	24	„	Bo.	5−7, 6+5	8·0	
„ 24	88	40	2	Hw.	2−12, 6+3	8·2	
„ 26	90	T.50	I	Bn.	5−10, 3−8, 6+2, 8+4·5	8·3	
„ 28	92	24	2	Bo.	5−4, 6+8	7·7	
Mar. 1	93	50	I	Ma.	=6	8·5	
„ 1	0193	t.22	„	Ni.	3−9, 6+1	8·4	

(4557) S URSÆ MAJORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Mar. 1	0193	45	1	Br.	3−6, 6+3	8·2	
„ 6	98	T.50	„	Bn.	5−3, 3−3, 6+7, 8+12	7·7	
„ 7	0199	24	„	Bo.	5−4, 6+8	7·7	
„ 9	0201	75	2	La.	3−4, 6+5	8·0	
„ 11	03	40	1	Hw.	2−11, 6+4	8·1	
„ 14	06	t.22	2	Ni.	=6	8·5	
„ 16	08	45	1	Br.	3−6, 6+4	8·1	
„ 18	10	t.22	„	Ni.	3−9, 6+1	8·4	
„ 21	13	T.50	„	Bn.	5−5, 3−5, 6+5, 8+10	7·9	
„ 27	19	„	„	„	5−4, 3−3·5, 6+7, 8+11·5	7·8	
„ 27	19	45	„	Br.	3−4, 6+6	7·9	
„ 28	20	24	„	Bo.	5−3, 6+9	7·6	
„ 31	23	T.50	„	Bn.	5−4, 3−3·5, 6+7, 8+11·5	7·8	
„ 31	23	20	„	La.	3−4, 6+6	7·9	
„ 31	23	t.22	„	Ni.	3−8, 6+2	8·3	Yellow.
April 5	28	40	„	La.	3−5, 6+5	8·0	
„ 10	33	20	„	„	3−5, 6+5	8·0	
„ 12	35	t.22	„	Ni.	3−7, 6+2	8·3	
„ 12	35	24	2	Bo.	5−1, 6+11	7·4	
„ 15	38	45	1	Br.	3−4, 6+6	7·9	
„ 16	39	20	„	La.	3−5, 6+5	8·0	
„ 18	41	24	„	Bo.	5−3, 6+9	7·6	
„ 20	43	t.22	„	Ni.	3−9, 6+0·5	8·4	
„ 22	45	20	„	La.	3−7, 6+3	8·2	
„ 22	45	40	„	Hw.	2−10, 6+4	8·1	
„ 25	48	24	„	Bo.	5−6, 6+6	7·9	
„ 25	48	T.50	„	Bn.	5−11, 3−6·5, 6+3, 8+3	8·3	
„ 26	49	45	„	Br.	6+3, 8+6	8·2	
„ 28	51	t.30	„	Bn.	5−11, 3−8, 6+2, 8+3	8·4	
„ 28	51	20	„	La.	=6, 8+2	8·6	
„ 28	51	t.22	„	Ni.	8−2·5, 9+6	9·1	
May 2	55	24	„	Bo.	6−1, 8+2·5	8·6	
„ 2	55	40	2	Hw.	=6	8·5	
„ 3	56	„	1	La.	=6, 8+3	8·5	
„ 8	61	24	2	Bo.	=8	8·8	
„ 12	65	40	1	La.	8−4, =h, 9+5	9·2	
„ 14	67	45	„	Br.	8−1	8·9	
„ 15	68	24	„	Bo.	8−2, 9+6	9·1	
„ 16	69	T.50	„	Bn.	8+1	8·7	
„ 17	70	t.22	„	Ni.	8−7, 9+2	9·5	
„ 18	71	40	2	Hw.	8−7, 9+1·5	9·6	
„ 21	74	24	1	Bo.	8−3, 9+6	9·1	
„ 21	74	T.50	„	Bn.	8−2·5, 9+7	9·1	
„ 23	76	40	„	La.	h−3, 9+2	9·5	
„ 25	78	T.50	„	Bn.	8−7, 9+2·5	9·5	
„ 26	79	45	„	Br.	13−2, 19+6	10·3	
„ 28	81	24	2	Bo.	=10	9·9	
„ 30	0283	t.22	1	Ni.	=13	10·1	In T.94, 9·9.

(4557) S URSÆ MAJORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
June 2	0286	40	1	La.	9−4, =13, 17+5	10·1	
,, 4	88	T.95	,,	Bn.	12−1, 14+0·5	10·2	
,, 6	90	T.94	,,	Ni.	=13	10·1	
,, 13	97	40	,,	La.	13−4, 17+1	10·5	
,, 14	0298	45	,,	Br.	13−5, 19+3	10·6	
,, 17	0301	T.95	,,	Bn.	14−5·5, 19+1	10·8	
,, 17	01	40	2	La.	13−3, 17+2	10·4	
,, 22	06	,,	1	,,	17−5, =22, 26+4	11·1	
,, 24	08	T.95	,,	Bn.	19−1, 22+0·5	11·0	
,, 25	09	40	,,	La.	13−4, 16−1, =17	10·6	
,, 27	11	160	,,	Br.	19−1, 22+1	11·0	
,, 27	11	79	,,	Ma.	22−2, 23+2	11·3	
,, 28	12	,,	,,	,,	=22	11·1	
,, 29	13	T.94	2	Ni.	16−4, 22+1	11·0	
July 1	15	40	,,	La.	13−4, 16−2, =17	10·7	
,, 4	18	T.95	1	Bn.	=23	11·4	
,, 6	20	79	2	Ma.	19−1	11·0	
,, 7	21	T.94	1	Ni.	16−4, 22+1	11·0	
,, 9	23	79	,,	Ma.	22−0·5	11·1	
,, 15	29	,,	,,	,,	=22	11·1	
,, 16	30	T.94	2	Ni.	=22	11·1	
,, 16	30	40	,,	La.	22−5, =26	11·6	
,, 17	31	T.95	1	Bn.	=23	11·4	
,, 22	36	79	,,	Ma.	22−0·5	11·1	
,, 23	37	40	2	La.	22−2	11·3	
,, 25	39	79	1	Ma.	22−2, 23+2	11·3	
,, 27	41	T.94	,,	Ni.	22+0·5	11·0	
Aug. 2	47	79	,,	Ma.	22+1	11·0	
,, 3	48	160	,,	Br.	19−1, 22+1	11·0	
,, 10	55	40	,,	La.	9−4, =13	10·1	
,, 10	55	T.94	,,	Ni.	9−2, 13+2	9·9	
,, 14	59	T.50	,,	Bn.	12−1·5, 14+1	10·2	
,, 17	62	t.22	,,	Ni.	=9	9·7	
,, 21	66	45	,,	Br.	8−9, 13+3	9·8	
,, 23	68	40	,,	La.	8−4, 9+4	9·3	
,, 26	71	T.50	,,	Bn.	9+1·5	9·6	
,, 28	73	40	,,	La.	8−2, 9+6·5	9·1	
,, 30	75	T.50	,,	Bn.	8−7·5, 9+2	9·6	
Sept. 1	77	t.22	,,	Ni.	8−3·5, 9+5	9·2	
,, 6	82	T.50	,,	Bn.	8−2·5, 9+7	9·1	
,, 9	85	t.22	,,	Ni.	=8	8·8	
,, 10	86	45	,,	Br.	=6	8·5	
,, 10	86	T.50	,,	Bn.	8+1	8·7	
,, 12	88	40	,,	La.	=6, 8+3	8·5	
,, 17	93	T.50	,,	Bn.	6+1	8·4	
,, 18	94	t.22	,,	Ni.	6−2, 8+2	8·7	
,, 19	95	T.50	,,	Bn.	5−11, 6+1	8·4	
,, 23	99	45	,,	Br.	6+2	8·3	
,, 23	0399	40	,,	Hw.	6+1·5, 8+4	8·4	
,, 24	0400	T.50	,,	Bn.	6+1	8·4	
Oct. 1	07	,,	,,	,,	5−11, 6+1	8·4	
,, 6	0412	t.22	,,	Ni.	=6	8·5	

(4557) S URSÆ MAJORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Oct. 11	0417	T.50	1	Bn.	3−8, 6+2	8·3	
„ 12	18	40	„	La.	6−2, 8+2	8·7	
„ 14	20	60	2	Br.	6+4	8·1	
„ 27	33	40	„	Hw.	5−6, 6+6	7·9	
Nov. 1	38	T.50	1	Bn.	5−9, 6+2	8·3	
„ 2	39	t.22	„	Ni.	3−8, 6+2	8·3	
„ 3	40	40	2	Hw.	2−10, 6+4	8·1	
„ 10	47	45	1	Br.	6+3, 8+6	8·2	
„ 12	49	t.22	2	Ni.	3−9, 6+1	8·4	
„ 16	53	T.50	1	Bn.	3−7, 6+3	8·2	
„ 18	55	20	„	La.	3−6, 6+4	8·1	
„ 21	58	t.22	„	Ni.	3−8, 6+2	8·3	
„ 25	62	40	2	Hw.	5−8, 6+3·5	8·1	
„ 27	64	60	1	Br.	6+4	8·1	
Dec. 3	70	t.22	„	Ni.	6+0·5	8·5	
„ 5	72	T.50	„	Bn.	3−9, 6+1	8·4	
„ 5	72	40	„	Hw.	5−10, 6+1	8·4	
„ 14	81	60	„	Br.	6−2, 8+1	8·7	
„ 15	82	20	„	La.	6−2, =8, h+4	8·8	
„ 16	83	T.50	„	Bn.	6−1, 8+2	8·6	
„ 21	88	40	2	Hw.	=8	8·8	
„ 21	88	t.22	1	Ni.	8−2, 9+6	9·1	
„ 24	91	„	„	„	8−4, 9+4	9·3	
„ 31	0498	45	2	Br.	8−3	9·1	

(4826) R HYDRÆ. (V. 1.)

H.D. 132422.

NOTES.

Star M	= B.D. − 20° 3818,	6·52 m. P.D.M.
„ N	= Cordoba − 21° 10,974,	6·65 m. „
„ P	= 73 Virginis	5·88 m. „
„ R	= κ „	4·31 m. H.P.
„ S	= λ „	4·60 m. „
„ T	= *i* Centauri,	4·39 m. P.D.M.
„ V	= 69 Virginis,	4·90 m. „
„ W	= 89 „	5·13 m. „

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1905.							
Mar. 30	6935	B.	1	Ma.	=h	5·1	
Apr. 24	60	„	„	„	a−12, h+6	4·5	
„ 29	6965	„	„	„	a−12, h+6	4·5	

(4826) R HYDRÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1905.							
May 3	6969	B.	1	Ma.	a−12, h+6	4·5	
,, 5	71	,,	2	,,	a−12, h+6	4·5	
,, 15	81	,,	3	,,	h+5	4·6	
,, 27	6993	,,	1	,,	h+2	4·9	
1906.							
May 18	7349	,,	,,	,,	h−2	5·3	
,, 24	7355	,,	,,	,,	h+1	5·0	
Dec. 1	7546	30	2	Ry.	14−4·5, 19+1	9·4	
,, 18	63	,,	,,	,,	14−3, 17−1·5, 19+1, 22+6	9·4	
,, 25	70	,,	,,	,,	14−3·5, 19−1, 22+6	9·4	
1907.							
Jan. 4	80	60	1	,,	19−1·5, 22+2	9·7	
,, 10	7586	,,	,,	,,	19−1, 22+3	9·6	
Feb. 9	7616	30	2	,,	14−2, 19+4	9·1	Doubtful.
,, 14	21	60	,,	,,	14−1, 17+1, =19	9·2	
,, 25	32	30	,,	,,	11+1, 14+4	8·5	
Mar. 6	41	,,	,,	,,	6−7, 14+4	8·5	
Apr. 17	83	t.30	,,	Bn.	=6	7·8	
,, 30	7696	38	1	Gd.	6+2	7·6	
May 7	7703	,,	2	,,	5−1, 6+1	7·8	
,, 9	05	t.30	1	Bn.	3−6, 6+2	7·6	
,, 11	07	,,	,,	,,	3−6, 6+2	7·6	
,, 18	14	,,	,,	,,	=3	7·0	
,, 29	25	,,	,,	,,	1−5·5, 3+1	6·9	
June 2	29	,,	2	,,	1−5, 3+2	6·8	
,, 9	36	,,	,,	,,	1+1	6·2	
July 28	7785	B.	3	Ry.	..	5·3	About.
Dec. 14	7924	30	1	,,	6+1	7·7	
,, 28	38	,,	,,	,,	6−2	8·0	
1908.							
Jan. 27	7968	60	2	,,	14−3, 19+2	9·3	
Feb. 29	8001	30	,,	,,	17−2, =19	9·5	
Mar. 23	24	60	,,	,,	14+1·5	8·8	
,, 30	31	30	,,	,,	6−6·5, 14+5	8·5	
Apr. 2	34	,,	,,	,,	6−6, 14+6	8·4	
,, 22	54	,,	1	Mg.	=17	9·3	Doubtful. [C.L.B.]
,, 24	8056	t.30	2	Bn.	6−1, 7+1	7·9	

(4826) R HYDRÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1908.							
May 1	8063	38	2	Gd.	6+3	7·5	
,, 6	68	30	,,	Ry.	14+3	8·7	Doubtful. [C.L.B.]
,, 6	68	t.30	,,	Bn.	3−2, 5+4, 6+6	7·3	
,, 10	72	,,	1	,,	1−2, 2+4	6·6	
,, 17	79	,,	,,	,,	1−3, 2−1, 3+3	6·9	
,, 27	89	,,	,,	,,	[illegible]−1, 2+3	6·6	
June 5	8098	B.	2	Mg.	3+2	6·8	
,, 7	8100	,,	,,	,,	=0	6·8	
July 1	24	,,	1	,,	m−2, 1+2	6·1	
,, 5	28	,,	,,	,,	m−2, 1+2	6·1	
,, 15	38	,,	2	,,	k−2, l+2	5·4	
,, 25	48	N.E.	,,	,,	=h	5·1	
Aug. 4	58	,,	1	,,	=T	4·4	
,, 6	60	,,	2	,,	b−5, e+3	4·0	
,, 10	64	,,	1	,,	=c	3·8	
,, 13	67	,,	2	,,	b−3, c+1	3·8	
,, 18	72	,,	1	,,	b−3, c+3	3·7	
,, 23	77	,,	,,	,,	b−4, c+2	3·8	
,, 24	78	,,	,,	,,	b−3, c+3	3·7	
,, 28	82	,,	,,	,,	c+2	3·6	
Sept. 5	90	,,	,,	,,	c+2	3·6	
,, 13	98	,,	2	,,	=c	3·8	
,, 14	8199	,,	,,	,,	c−1, d+1	3·9	
,, 19	8204	,,	1	,,	c−1, d+1	3·9	
Dec. 11	87	18	,,	Ry.	=q	7·3	
,, 21	8297	F.	2	,,	q−1	7·4	
,, 31	8307	18	,,	,,	q−2, 6+2	7·6	
1909.							
Jan. 1	08	30	,,	Mg.	=6	7·8	
,, 15	22	,,	1	,,	=6	7·8	
,, 16	23	,,	,,	Ry.	6−3, 11+4	8·1	
,, 26	33	t.30	,,	Bn.	7−3, 9+1·5	8·3	Red.
,, 28	35	30	,,	Ry.	11+1·5, 14+3	8·5	
Feb. 13	51	,,	2	Mg.	14+2	8·8	
,, 21	59	,,	1	Ry.	11−3, 14+2	8·8	
,, 27	65	,,	,,	,,	14+1, 17+2	9·0	
Mar. 18	84	,,	,,	,,	=19	9·5	
,, 20	86	60	,,	,,	19−1·5, 22+5	9·5	
,, 27	8393	,,	,,	,,	19−1, 22+5	9·5	About.
Apr. 11	8408	,,	,,	,,	19−2, 22+3	9·7	
,, 14	11	,,	,,	,,	19−1·5, 17−3, 22+4	9·6	
,, 14	11	30	,,	D.R.	=18	9·6	
,, 18	15	t.60	,,	Bn.	14−3, 18+1	9·4	
,, 20	17	,,	,,	,,	14−3, 18+1	9·4	
,, 21	8418	60	2	Ry.	17−4, 19−2	9·7	

(4826) R HYDRÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1909.							
May 8	8435	t.60	1	Bn.	14−3, 18+1	9·4	
,, 8	35	30	2	Ry.	=19	9·5	
,, 10	37	t.45	1	Bn.	14−3, 18+1	9·4	
,, 17	44	30	,,	Ry.	17−2·5, 19+1	9·5	
,, 18	45	t.45	,,	Bn.	14−3, 18+1	9·4	
,, 19	46	30	2	D.R.	14−2, 17+3	9·1	
,, 22	49	,,	1	Ry.	=14	9·0	
,, 23	50	t.30	,,	Bn.	=13, =14	9·0	
June 12	8470	30	,,	Ry.	6−4, 14+4	8·4	
Aug. 6	8525	B.	2	Mg.	=m	5·9	
Sept. 5	55	,,	,,	,,	=k	5·3	
,, 7	57	,,	,,	,,	h−1, k+1	5·2	
,, 25	8575	,,	,,	,,	g+3	4·5	
Nov. 23	8634	F.	,,	Ry.	M+2	6·3	
Dec. 3	44	B.	1	,,	h−5, P+3	5·6	
,, 8	49	,,	2	,,	h−5, P+3	5·6	
,, 22	63	,,	,,	,,	=N	6·7	
,, 30	8671	,,	,,	,,	=M	6·5	
1910.							
May 30	8822	130	1	Wl.	. .	9·4	About. Orange red.
June 22	45	60	,,	,,	. .	8·6	,, ,,
,, 25	48	,,	,,	,,	8−2, 14+3	8·6	Red.
,, 28	51	,,	,,	,,	=8	8·4	Reddish.
July 4	57	,,	,,	,,	5−1, 6+0·5	7·8	Orange red.
,, 9	62	,,	,,	,,	5−1, 6+1	7·8	Reddish.
,, 14	67	,,	,,	,,	=4, =5	7·7	,,
,, 18	71	,,	,,	,,	2−4, 4+2	7·5	Orange.
,, 23	76	,,	,,	,,	2−3, 4+3	7·4	Reddish.
,, 26	79	,,	,,	,,	1−5, 2+2·5	6·9	Orange red.
,, 31	84	B.	,,	,,	1−6, 2+2	6·9	Reddish.
Aug. 1	85	,,	,,	,,	1−5, 2+2·5	6·9	
,, 5	89	,,	,,	,,	1−6, 2+2	6·9	Reddish.
,, 7	91	,,	,,	,,	1−5, 2+2·5	6·9	,,
,, 10	94	60	2	,,	1−4, 2+3	6·8	,,
,, 14	8898	,,	1	,,	1−4, 2+4	6·7	,,
,, 18	8902	,,	,,	,,	1−3, 2+4·5	6·7	,,
,, 26	10	,,	,,	,,	1−4, 2+4	6·7	,,
,, 31	15	F.	,,	,,	1−6, 2+2	6·9	,,
Sept. 2	8917	,,	2	,,	1−3, 2+4·5	6·7	,,
1911.							
Jan. 6	9043	B.	1	Bn.	h−1	5·2	Orange.
,, 9	46	,,	,,	,,	h−4	5·5	,,
,, 19	9056	,,	2	Go.	k−3, m+3	5·6	,,

(4826) R HYDRÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
Jan. 26	9063	B.	1	Go.	1−5, 2+2·5	6·9	Orange.
„ 27	64	„	2	Gi.	1+1	6·2	
„ 28	65	„	1	Go.	1−6, 2+1	7·0	Orange.
„ 31	68	T.25	„	Bn.	1+2	6·1	
Feb. 2	70	B.	2	Gi.	1−1	6·4	
„ 4	72	„	1	„	1−1	6·4	
„ 4	72	„	„	Go.	=3	7·0	Orange.
„ 17	85	60	„	Wl.	1−4, 2+4	6·7	Red.
„ 20	88	30	„	Go.	=4, =5	7·7	Doubtful.
„ 28	96	F.	„	Wl.	1−3, 2+4	6·7	Red.
Mar. 2	9098	30	2	Go.	2−4, 4+2	7·5	
„ 24	9120	B.	1	Gi.	=7	8·0	
Apr. 9	36	15	„	Wl.	5−2, 6+1	7·8	Reddish.
„ 24	51	t.60	2	Bn.	=12	8·9	Red.
„ 27	54	15	1	Wl.	6−3, 7−1, 8+2	8·2	
May 4	61	t.60	„	Bn.	10−1·5, 14+1	8·9	
„ 24	81	t.30	„	„	9−3, 14+1	8·8	
„ 27	9184	„	„	„	10−1, 14+1	8·8	
June 30	9218	60	„	Go.	14−3, 19+3	9·2	
July 16	34	„	„	„	11−3, 14+2	8·8	
„ 19	37	30	„	„	7−2, 8+2	8·2	
„ 22	40	„	2	„	7−2, 8+2	8·2	
„ 25	43	30	1	„	7−1, 8+2	8·2	
„ 30	48	„	„	„	=7	8·0	
Aug. 3	52	„	2	„	5−3, 7+0·5	8·0	
„ 11	60	„	1	Bd.	6−3, 14+9	8·1	
„ 12	61	„	„	Go.	5−1·5, 7+2	7·8	Orange.
„ 13	62	„	„	Bd.	=6	7·8	
„ 15	64	„	„	„	=6	7·8	
„ 18	67	„	„	„	=5	7·7	
„ 18	67	60	„	Go.	=6	7·8	Red.
„ 25	74	30	„	„	5−1, 6+0·5	7·8	„
„ 25	74	„	„	Bd.	=4	7·6	
„ 30	79	„	„	Go.	5−1, 6+1	7·8	Red.
„ 30	79	„	2	Bd.	=4	7·6	
Sept. 1	81	„	„	Go.	2−2, 4+3·5	7·3	Red.
„ 10	90	„	„	„	1−5, 2+2·5	6·9	„
„ 11	91	„	„	Bd.	2−3, 4+3	7·4	
„ 12	92	„	„	Go.	1−4, 2+4	6·7	Red.
„ 13	93	„	1	Bd.	=3	7·0	
„ 15	95	„	2	„	=3	7·0	
„ 16	96	„	„	Go.	2−1, 4+4	7·2	
„ 17	97	„	„	„	1−6, 3+1·5	6·9	Red.
„ 19	9299	„	„	Bd.	=3	7·0	
„ 21	9301	„	1	„	2−3, 4+3	7·4	
„ 23	03	„	„	„	2−3, 4+3	7·4	
„ 23	03	„	2	Go.	1−6, 3+1·5	6·9	Red.
„ 28	9308	„	3	„	1−4, 2+4	6·7	

(4826) R HYDRÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
Dec. 1	9372	B.	3	Gi.	h−2	5·3	
,, 18	89	,,	2	,,	f−2, g+2	4·6	
,, 26	9397	,,	1	Wd.	=g	4·8	
,, 29	9400	,,	,,	Gi.	f−2, R−1; S+2	4·5	
1912.							
Jan. 1	03	,,	2	,,	R−1, S+2	4·4	
,, 10	12	,,	1	,,	R−1, S+2	4·4	
,, 10	12	,,	,,	Wd.	a−10, g+5	4·3	
,, 23	25	,,	,,	,,	g+3	4·5	
,, 25	27	,,	2	Gi.	S−1, g+2	4·6	
Feb. 5	38	,,	,,	,,	g+1	4·7	
,, 11	44	,,	1	,,	g−2, h+1	5·0	
,, 12	45	,,	,,	Go.	=h	5·1	
,, 18	51	,,	,,	,,	m−2, l+2	6·1	
,, 19	52	,,	,,	Wd.	g−4	5·2	
,, 23	56	,,	,,	Gi.	k−3, l+2	5·5	
,, 25	58	,,	,,	Go.	1−2, 2+6	6·5	
Mar. 11	73	20	,,	La.	=1	6·3	In B. 6·8.
,, 17	79	B.	,,	Go.	1−6, 2+1·5	7·0	
,, 19	81	40	,,	Gi.	1−2, 2+4	6·6	
,, 19	81	20	,,	La.	1−2, 3+6	6·5	Orange. In B. 7·0.
,, 24	86	F.	,,	Go.	=2, =3	7·1	
,, 25	87	20	2	La.	1−4, 3+2	6·8	
Apr. 4	97	40	1	Gi.	=2, 4+4	7·2	
,, 6	9499	20	2	La.	=4	7·6	
,, 7	9500	F.	1	Go.	=3	7·0	
,, 8	01	20	,,	La.	2−4, 4+1, 6+3	7·5	
,, 13	06	,,	,,	,,	4−1, =5, 6+1	7·7	
,, 14	07	25	,,	Wd.	=6	7·8	
,, 14	07	F.	,,	Go.	5−1, 6+1	7·8	
,, 22	15	40	,,	Gi.	5−2, 6+4	7·7	
,, 22	15	20	,,	La.	=6	7·8	
,, 23	16	40	,,	,,	6−1, 7+1	7·9	
,, 25	18	20	,,	,,	5−1, 6+0·5	7·8	
,, 28	21	F.	2	Go.	=6	7·8	
May 5	28	30	1	,,	=7	8·0	
,, 6	29	40	,,	La.	=8	8·4	
,, 7	30	,,	2	Gi.	6−2, 7+2	7·9	
,, 9	32	,,	1	,,	6−1, 7+2	7·9	
,, 9	32	,,	,,	La.	=11	8·5	
,, 17	40	,,	,,	Gi.	7−1, 9+2	8·2	
,, 31	54	,,	,,	La.	14−0·5	9·0	
June 2	56	30	2	Go.	11−3, 14+1·5	8·8	
,, 4	58	40	1	Gi.	=10, 11+1	8·5	
,, 4	58	,,	2	La.	14−1, 17+2	9·1	
,, 6	60	25	1	Wd.	14+2·5	8·7	
,, 8	62	40	,,	La.	14−1, 17+1	9·1	
,, 10	64	,,	,,	Gi.	11−1·5, 13+1	8·8	
,, 15	9569	,,	,,	La.	14−2, 17+1	9·2	

(4826) R HYDRÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
June 18	9572	25	1	Wd.	14+1·5	8·8	
„ 19	73	40	„	Gi.	=13, 14+1	8·9	
„ 19	73	„	2	La.	14−2, 17+1	9·2	
July 1	85	25	1	Wd.	=14	9·0	
„ 12	96	60	„	Go.	=19	9·5	
„ 14	9598	25	„	Wd.	=14	9·0	
Aug. 1	9616	„	„	„	19+2	9·3	
„ 6	21	60	„	Go.	19−2, 25+6	9·7	
„ 12	27	25	„	Wd.	19+2	9·3	
Sept. 2	48	„	„	„	14+1·5	8·8	
„ 8	54	„	„	„	14+1·5	8·8	
„ 29	9675	„	„	„	6−5	8·3	
Nov. 24	9731	„	2	„	6+3	7·5	About. Difficult.
Dec. 5	42	20	1	La.	=2	7·1	
„ 7	44	„	2	„	=2, 3−1	7·1	
„ 9	46	„	„	„	=3	7·0	
„ 12	49	25	1	Wd.	6+5	7·3	
„ 21	58	„	„	„	6+10	6·8	
1913.							
Jan. 3	71	B.	2	Gi.	m−3, 1+3	6·1	
„ 4	72	„	1	Wd.	1−2	6·5	
„ 6	74	20	2	La.	1+3	6·0	In B. 6·1.
„ 10	78	B.	1	Wd.	1+3	6·0	
„ 12	80	„	„	La.	=l	5·6	
„ 12	80	„	„	Wd.	1+3	6·0	
„ 15	83	„	„	„	1+3	6·0	
„ 18	86	„	„	„	h−4, m+4	5·5	
„ 26	94	„	2	„	=h	5·1	
„ 31	9799	„	1	„	=g	4·8	
Feb. 3	9802	„	„	Gi.	f−4, g+1·5	4·7	
„ 4	03	„	„	Wd.	f−2, g+2	4·6	
„ 7	06	„	„	„	f−2, g+2	4·6	
„ 7	06	„	„	Gi.	f−3·5, g+2	4·7	
„ 9	08	„	„	La.	f−1, g+2·5	4·5	
„ 11	10	„	„	Wd.	=f	4·4	
„ 13	12	„	„	„	=f	4·4	
„ 13	12	„	„	La.	=f	4·4	
„ 15	14	„	„	„	f−2, g+2	4·6	
„ 15	14	„	„	Gi.	f−3, g+2	4·7	
„ 15	14	„	„	Wd.	=f	4·4	
„ 19	18	„	„	„	=f	4·4	
„ 24	23	„	„	„	=f	4·4	
„ 26	25	„	2	„	f−2	4·6	
„ 28	27	„	1	„	f−2, g+2	4·6	
Mar. 1	28	„	„	La.	=f	4·4	Orange.
„ 2	29	„	„	Go.	=g	4·8	
„ 2	9829	„	„	Wd.	f−2, g+2	4·6	

(4826) R HYDRÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Mar. 3	9830	B.	1	Gi.	=g	4·8	
" 3	30	"	2	La.	f−2, g+2	4·6	
" 5	32	"	1	"	f−3, g+1	4·7	
" 6	33	"	"	Wd.	f−2, g+2	4·6	
" 7	34	"	"	"	=g	4·8	
" 11	38	"	"	Gi.	g−2, h+1	5·0	
" 11	38	"	2	Go.	f−2·5, g+1	4·7	
" 12	39	"	1	Wd.	g−1, h+1	4·9	
" 13	40	"	2	La.	g−1, h+1	4·9	
" 16	43	"	"	Go.	g−1, h+1	4·9	
" 17	44	"	1	Wd.	=h	5·1	
" 24	51	"	"	"	h−1, k+1·5	5·2	
" 30	57	"	3	La.	k−1, l+1	5·4	
" 31	58	"	1	Go.	h−4, m+4	5·5	
Apr. 3	61	"	"	Wd.	k−1, l+1	5·4	
" 6	64	"	"	La.	l−1, m+2	5·7	
" 8	66	"	"	Wd.	l−1	5·7	
" 12	70	"	"	"	l−1	5·7	
" 15	73	"	"	"	=m	5·9	
" 17	75	"	2	Go.	=2	7·1	Doubtful. [C.L.B.]
" 19	77	"	1	Wd.	m−2, 1+2	6·1	
" 26	84	"	"	"	=1	6·3	
" 27	85	"	"	Go.	=3	7·0	Doubtful. [C.L.B.]
" 28	86	20	2	La.	m−1, 1+4	5·9	In B. 6·6.
" 30	88	"	1	"	m−2, 1+2	6·1	In B. 6·7.
May 5	93	"	"	"	1−1, 3+6	6·4	In B. 6·9.
" 7	95	"	"	"	1−3, 3+4	6·6	Orange red.
" 7	95	25	"	Wd.	1−2·5, 2+5	6·6	
" 9	97	20	2	La.	1−3, 3+3	6·7	
" 10	98	40	"	Gi.	1−3, 3+2	6·7	
" 11	9899	t.30	1	Bn.	2+2, 3+1	6·9	
" 12	9900	25	"	Wd.	1−5, 2+2·5	6·9	
" 13	01	T.25	"	Bn.	1−3, 2+1	6·8	
" 20	08	20	"	La.	2−5	7·6	Yellow.
" 22	10	"	"	"	=4	7·6	
" 23	11	25	"	Wd.	=2	7·1	
" 24	12	20	"	La.	4−1, =5	7·7	Orange. In B. 8·0.
" 25	13	40	"	Gi.	4−2, 6+3·5	7·7	
" 28	16	20	"	La.	4−2, 5−2	7·9	
June 1	20	40	"	Gi.	5−2, 6+3	7·7	
" 5	24	"	"	La.	5−3, =7, 11+4, 14+6	8·1	
" 7	26	25	"	Wd.	5+2, 6+2	7·6	
" 8	27	40	"	La.	5−4, =7, 11+3	8·1	
" 8	27	"	"	Gi.	5−3, 6+2	7·8	
" 13	32	25	"	Wd.	5+2, 6+2	7·6	
" 21	40	40	2	La.	8−1, 11+2, 14+5	8·4	
" 24	43	25	1	Wd.	7−2, 8+2	8·2	
" 26	45	"	"	"	=8	8·4	
" 29	48	"	"	"	8−2	8·6	
July 2	51	"	"	"	8−2, 14+4	8·6	
" 5	54	"	"	"	14+1·5	8·8	
" 6	9955	60	"	Go.	=14	9·0	

(4826) R HYDRÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Aug. 2	9982	25	1	Wd.	=14	9·0	
,, 18	9998	,,	,,	,,	=17	9·3	
Sept. 18	0029	,,	,,	,,	=17	9·3	Red.
Nov. 20	92	,,	2	,,	6−8, 14+4	8·6	About. Difficult.
,, 26	0098	40	,,	La.	4−3	7·9	
,, 30	0102	20	,,	,,	4−2, 5−1	7·8	
Dec. 9	11	40	1	,,	4−1, 5+2	7·6	
,, 11	13	20	2	,,	4−1, 5−2	7·8	
,, 21	23	,,	1	,,	2−4, =4	7·6	Orange.
,, 27	29	25	,,	Wd.	6−2, =7	8·0	
1914.							
Jan. 2	35	20	,,	La.	=4, 5+2	7·6	
,, 6	39	25	,,	Wd.	6+2	7·6	
,, 23	56	20	,,	La.	1−6, 2+1	7·0	
Feb. 2	66	25	,,	Wd.	=2	7·1	About.
,, 3	67	20	,,	La.	m−2, 1+3	6·0	In B. 6·7.
,, 4	68	T 25	2	Bn.	2+5, 4+10	6·6	
,, 5	69	20	1	La.	m−2, =1	6·2	Orange red. In B. 6·7.
,, 13	77	25	,,	Wd.	1−4, 2+4	6·7	
,, 17	81	,,	,,	,,	=1	6·3	
,, 21	85	B.	,,	,,	1+2	6·1	
,, 25	89	,,	,,	,,	l−2	5·8	
,, 28	92	,,	,,	Bn.	h−2	5·3	
,, 28	92	,,	,,	Wd.	k−1, l+1	5·4	
Mar. 3	95	,,	,,	,,	=k	5·3	
,, 7	0199	,,	,,	,,	=h	5·1	
,, 9	0201	,,	,,	La.	f−1, g+3	4·5	Yellowish orange.
,, 10	02	,,	,,	Wd.	g−1	4·9	
,, 11	03	,,	,,	,,	=g	4·8	
,, 11	03	,,	,,	Bc.	V+3	4·6	
,, 18	10	,,	,,	Wd.	g+2	4·6	
,, 21	13	,,	,,	,,	g+2	4·6	
,, 22	14	,,	,,	,,	=f	4·4	
,, 24	16	,,	,,	,,	=f	4·4	
,, 26	18	,,	,,	Bc.	b−5	4·0	
,, 29	21	,,	,,	Wd.	=f	4·4	
,, 31	23	,,	,,	,,	=f	4·4	
,, 31	23	,,	,,	La.	e−4, =f, g+4	4·5	Orange.
Apr. 2	25	,,	2	,,	f−1, g+4	4·5	,,
,, 4	27	,,	1	Wd.	=f	4·4	
,, 5	28	,,	,,	La.	=g, h+4, k+5	4·8	
,, 6	29	,,	,,	Wd.	=f	4·4	
,, 9	32	,,	,,	,,	=f	4·4	
,, 12	35	,,	,,	,,	f−2, g+2	4·6	
,, 12	35	,,	,,	Bn.	h+2	4·9	
,, 13	36	,,	,,	La.	f−4, g+1	4·8	
,, 13	0236	,,	,,	Bc.	=T	4·4	

(4826) R HYDRÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Apr. 14	0237	B.	1	La.	f−1, g+2	4·6	Orange.
,, 14	37	,,	,,	Ma.	=h	5·1	
,, 15	38	,,	,,	Bn.	h+2	4·9	
,, 16	39	,,	,,	Wd.	f−2, g+2	4·6	
,, 16	39	,,	,,	La.	f−3, g+1	4·7	
,, 16	39	N.E.	,,	Ma.	h−1	5·2	
,, 17	40	B.	,,	Wd.	=g	4·8	
,, 18	41	,,	2	Ma.	h+1	5·0	
,, 19	42	,,	1	Bn.	h+1	5·0	
,, 20	43	,,	,,	Wd.	=g	4·8	
,, 20	43	,,	2	Ma.	=h	5·1	
,, 21	44	,,	1	Bc.	=T	4·4	
,, 22	45	,,	,,	Wd.	=h	5·1	
,, 22	45	,,	,,	La.	f−4, =g, h+2	4·8	
,, 23	46	,,	2	Ma.	h−2	5·3	
,, 25	48	,,	1	Bn.	h+1	5·0	
,, 26	49	,,	2	Br.	g−2, h+2	4·9	
,, 27	50	p.	1	Bn.	h+1	5·0	p.=2″ O.G.
,, 27	50	B.	,,	La.	=g, h+3	4·8	
,, 28	51	,,	,,	Wd.	h−1	5·2	
,, 28	51	,,	,,	Ma.	h+1·5	4·9	
,, 29	52	,,	,,	La.	g−1, h+2	4·9	
May 1	54	,,	,,	Ma.	h−1	5·2	
,, 2	55	,,	,,	Wd.	h−1	5·2	
,, 2	55	,,	,,	Bc.	W+1	5·0	
,, 4	57	,,	,,	La.	g−5, =h	5·2	
,, 4	57	,,	2	Ga.	g−3, h−1, k−1	5·2	
,, 6	59	,,	1	La.	h−1, k+3	5·1	
,, 6	59	,,	,,	Bc.	W−1	5·2	
,, 11	64	,,	,,	La.	h−3, =k, l+2	5·3	
,, 11	64	,,	2	Ga.	h−3, k−3	5·5	
,, 14	67	,,	1	Wd.	=l	5·6	
,, 15	68	,,	2	Ma.	h−10	6·1	
,, 17	70	t.30	,,	Bn.	1+10	5·3	In B. 5·6.
,, 17	70	B.	1	Ga.	h−5, =m, 1+5	5·8	
,, 20	73	,,	,,	Wd.	=l	5·6	
,, 21	74	,,	,,	La.	l−1, m+2	5·7	
,, 24	77	,,	,,	Wd.	=m	5·9	
,, 24	77	20	,,	La.	=l, m+2, 1+8	5·6	Orange red. In B. 5·9.
,, 26	79	B.	,,	Ga.	l−3, m−1, 1+3	6·0	
,, 29	82	,,	,,	La.	m−2, 1+3	6·0	
June 9	93	20	,,	,,	m−1, 1+5	5·9	Orange.
,, 14	0298	,,	,,	,,	m−2, 1+3	6·0	
,, 17	0301	B.	,,	Wd.	1−2	6·5	
,, 18	02	20	,,	La.	m−4, =1, 2+4	6·4	
,, 22	06	,,	,,	,,	=1, 2+5, 3+5, 4+9	6·6	
,, 27	11	,,	,,	,,	2−3, 3−1	7·3	
,, 27	11	25	,,	Wd.	1−4, 2+4	6·7	
July 11	25	,,	,,	,,	4+2, 6+4	7·4	
,, 11	25	20	2	La.	2−4, =4	7·6	
,, 20	34	40	1	Bc.	6+4	7·4	
,, 22	0336	25	,,	Wd.	6+2	7·6	

(4826) R HYDRÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Aug. 8	0353	25	1	Wd.	=6	7·8	About.
„ 12	57	„	„	„	=7	8·0	
„ 24	69	„	„	„	7−2, 8+2	8·2	
Sept. 6	82	„	„	„	6−10, 14+2	8·8	
„ 11	87	„	„	„	6−10, 14+2	8·8	Very red.
„ 14	0390	„	„	„	14+2	8·8	„ „
Dec. 8	0475	„	„	„	6−6, =8, 14+6	8·4	
„ 15	0482	40	„	La.	11−3, 14+3, 17+8	8·6	

(4847) S VIRGINIS. (V. 2.)

H.D. 132706

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1906.							
Jan. 19	7230	90	1	Ry.	4−6, 6+2, 7+2, 8+3·5	9·1	
„ 20	31	35	2	„	=5, =6, 7+2, 8+2	9·1	
„ 22	33	„	1	„	6−3, 7+3, 8+3	9·2	
„ 26	37	90	„	„	6−4, 7+2	9·4	
„ 29	40	„	„	„	6−4·5, 7+1, 8−1	9·5	
Feb. 1	43	„	„	„	6−4, =7	9·5	
„ 4	46	„	„	„	7−3, 8+1	9·6	
„ 16	58	„	„	„	7−4, 8−3, 10−1, =12, 11+3	10·1	
„ 18	60	35	„	„	7−5, 8−3, 11−2, 18+3	10·3	
„ 24	66	90	„	„	11−3, 14−1	10·4	
Mar. 15	85	„	3	„	14−10, 18+2·5	11·0	
„ 18	88	„	„	„	14−4, =18	10·8	
„ 22	92	„	„	„	18−1	11·4	
„ 27	7297	„	„	„	18−3, 19−3	11·7	
April 13	7314	50	„	„	=23, =24	12·1	
„ 22	23	„	„	„	23−1, 24−1, =29	12·2	
„ 25	26	79	1	Ma.	23−3	12·3	
„ 28	29	„	„	„	<23	<12·0	Not seen.
May 19	7350	T.120	2	Bn.	12−14, 23+1	11·9	
Aug. 11	7434	60	3	Ry.	14−8·5, 18+4	10·9	
„ 18	41	35	„	„	14−4, 18+8	10·4	
„ 22	7445	„	„	„	14−6, 18+6	10·6	

(4847) S VIRGINIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1906.							
Nov. 13	7528	30	1	Ry.	2+1	6·7	
„ 16	31	„	„	„	=2	6·8	
„ 19	34	„	„	„	2−2·5, 3+8	7·0	
„ 24	39	„	„	„	2−5, 3+5	7·3	
„ 26	41	„	„	„	2−3·5, 3+7	7·1	
Dec. 1	46	„	„	„	2−4·5, 3+6	7·2	
„ 12	57	„	„	„	=3, 4+6	7·8	
„ 16	61	60	„	„	3−3, 4+3	8·1	
„ 18	63	30	„	„	3−2, 4+3	8·1	
„ 25	70	„	2	„	3−2, 4+3	8·1	
1907.							
Jan. 1	77	60	„	„	3−9, 4−1·5, 5+3	8·7	
„ 3	79	t.30	1	Bn.	3−8, 4−2, 5+4, 6+4	8·6	
„ 8	84	60	„	Ry.	4−3, 6+3	8·7	
„ 12	7588	„	„	„	4−4, 6+1	8·9	
„ 27	7603	„	2	„	6−4, 7+1	9·4	
Feb. 5	12	„	„	„	=7	9·6	
„ 9	16	30	„	„	=7	9·6	
„ 14	21	60	1	„	7−4, 8−1, 9−1, 10+2	9·9	
„ 22	29	T.50	„	Bn.	7−6, 8−4, 10+2, 11+2	10·0	
Mar. 5	40	T.70	„	„	11−1, 12+1	10·4	
„ 6	41	60	2	Ry.	14+1, 16+2	10·2	
„ 10	45	T.95	1	Bn.	11−1, 12+0·5	10·4	
„ 11	46	T.70	„	„	11−1, 12+0·5	10·4	
„ 14	49	60	2	Ry.	=14	10·0	
„ 20	55	T.70	1	Bn.	16−2, 18+3·5	10·9	
„ 21	56	„	„	„	16−2, 18+3·5	10·9	
„ 27	62	T.120	„	„	16−2, 18+3·5	10·9	
Apr. 3	69	60	„	Ry.	14−10, 18+2·5	11·0	
„ 7	73	t.85	2	Bn.	18−1, 19+1	11·4	
„ 30	96	79	1	Ma.	23+2	11·8	
May 2	7698	„	„	„	23+2	11·8	
„ 7	7703	38	„	Gd.	=23, =24	12·1	Very difficult.
„ 7	03	79	„	Ma.	23+0·5	12·0	
„ 7	03	T.150	„	Bn.	19−4, 22+1, 23+1	11·9	
„ 8	04	„	„	„	19−4, 22+1, 23+1, 24+1	11·9	
„ 11	07	„	2	„	23+1·5	11·9	
„ 12	08	„	1	„	19−4, 22+1, 23+1, 24+1	11·9	
„ 18	14	„	„	„	19−4, 22+1, 23+0·5, 24+1	12·0	
June 2	29	183	2	Ma.	23−1·5	12·2	
„ 2	29	T.120	„	Bn.	22−1, 23−1, 24−1	12·1	
„ 5	32	183	„	Ma.	23−2	12·2	
„ 6	7733	„	„	„	23−4	12·4	

(4847) S VIRGINIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1907.							
June 10	7737	T.120	1	Bn.	19−3, 22+1, 23+1, 24+1	11·9	
„ 16	43	„	2	„	19−3, 22+1, 23+2, 24+2·5	11·9	
July 28	7785	60	„	Ry.	11−1	10·4	
Nov. 28	7908	t.30	1	Bn.	2−6, 3+4	7·4	
Dec. 5	15	„	„	„	2−8·5, 3+2	7·6	
„ 6	16	30	2	Ry.	2−5, 3+5	7·3	
„ 9	19	t.30	1	Bn.	2−9, 3+1·5	7·7	
„ 12	22	60	2	Ry.	2−6, 3+4	7·4	
„ 14	24	30	1	„	2−7, 3+3·5	7·5	
„ 17	27	„	2	„	2−5, =3	7·6	
1908.							
Jan. 3	44	t.30	1	Bn.	3−5, 4+1	8·3	
„ 5	46	60	„	Ry.	3−2, =4	8·2	
„ 10	51	t.30	„	Bn.	3−9, 4−2, 5+4, 6+3	8·7	
„ 12	53	„	„	„	3−9, 4−4, 5+2, 6+2	8·8	
„ 26	67	60	„	Ry.	6−1, 7+4	9·1	
„ 27	68	„	„	„	6−1, 7+4	9·1	
Feb. 1	73	„	„	„	6−2, 7+4	9·2	
„ 3	75	T.50	„	Bn.	5−3, 6−4, 7+1, 8+1	9·4	
„ 7	79	T.70	2	„	=8	9·4	
„ 24	96	60	„	Ry.	8−6·5, 12+4	10·1	
„ 26	98	90	„	„	8−3·5, 12+7	9·8	
„ 27	7999	t.75	1	Bn.	10−1·5, 11+1	10·2	
Mar. 14	8015	T.120	„	„	12−0·5, 16+2	10·5	
„ 23	24	60	2	Ry.	=14	10·0	
„ 28	29	T.95	1	Bn.	14−10, 16−1, 18+3·5	10·9	
Apr. 2	34	60	2	Ry.	18+1	11·2	
„ 3	35	T.95	1	Bn.	14−10, 18+3·5	11·0	
„ 7	39	t.100	2	„	18+0·5	11·2	Difficult.
„ 19	51	38	1	Gd.	=22	12·0	
May 1	63	„	„	„	=23	12·0	
„ 6	68	T.120	2	Bn.	19−4, 22+2, 23+1·5	11·9	
„ 18	80	T.200	„	„	23−2	12·2	
„ 19	81	„	1	„	23−2	12·2	
„ 27	89	T.120	„	„	=22, =24	12·1	
June 2	95	183	2	Ma.	23−3	12·3	About.
„ 2	8095	T.120	„	Bn.	23+0·5, =24	12·0	
„ 29	8122	38	„	Gd.	<19	<11·5	Not seen.
Nov. 21	8267	30	„	Ry.	1−4, 2+3	6·5	
„ 24	70	18	1	„	1−4, 2+3	6·5	
Dec. 11	87	„	„	„	2−1·5	6·9	
„ 12	8288	„	„	„	2−1·5	6·9	

(4847) S VIRGINIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1908.							
Dec. 18	8294	30	1	Ry.	2−7, 3+2	7·6	
„ 21	8297	„	„	„	2−7, 3+2	7·6	
„ 27	8303	„	„	„	3−2, 4+4	8·0	
„ 30	06	„	„	„	3−3, 4+3	8·1	
1909.							
Jan. 8	15	t.30	„	Bn.	3−5, 4+1	8·3	
„ 12	19	30	„	Ry.	3−6, 4+2	8·3	
„ 16	23	60	„	„	=4	8·4	
„ 16	23	t.30	„	Bn.	3−10·5, 4−4, 5+2, 6+2	8·8	
„ 19	26	„	„	„	=5, 6−1, 7+4·5, 8+3	9·1	
„ 19	26	60	„	Ry.	4−2·5, 6+1	8·8	
„ 26	33	t.30	„	Bn.	5−1, 6−3, 7+3, 8+2	9·2	
„ 28	35	60	„	Ry.	6−2, 7+2	9·3	
„ 30	37	„	„	„	6−3, 7+2	9·3	
Feb. 14	52	„	„	„	=7, 8+2	9·4	
„ 15	53	T.50	„	Bn.	7−1·5, 11+6	9·7	
„ 16	54	60	„	Ry.	7−2, =8	9·6	
„ 22	60	„	„	„	7−1, 8+1	9·5	
„ 27	65	„	„	„	7−3, =8	9·6	
Mar. 16	82	„	„	„	14−3, 16+0·5, 18+3	10·6	
„ 16	82	T.95	„	Bn.	12−1, 16+1	10·6	
„ 23	89	60	2	Ry.	16−4, 18+2	11·1	
„ 27	8393	„	„	„	16−4, 18+1	11·2	
Apr. 9	8406	„	3	„	=18	11·3	
„ 14	11	79	2	Ma.	23+7·5	11·3	
„ 20	17	183	1	„	23+1·5	11·9	
May 7	34	„	2	„	23−2	12·2	
„ 8	35	„	1	„	23−2·5	12·3	
„ 8	35	T.120	„	Bn.	23−1, 31+3	12·1	
„ 10	37	183	„	Ma.	23−2	12·2	
„ 18	45	„	„	„	23−4	12·4	
„ 18	45	T.120	2	Bn.	24−3	12·4	
„ 19	46	„	1	„	23−3, 24−2, 31+1	12·3	
„ 21	48	183	„	Ma.	23−4	12·4	
„ 23	50	„	„	„	23−6	12·6	
„ 23	50	T.120	2	Bn.	23−3, 24−3	12·4	
„ 25	52	183	„	Ma.	23−4	12·4	
June 8	8466	„	„	„	<23	<12·0	Not seen.
Aug. 18	8537	60	1	Ry.	<12	<10·5	Not seen.
Nov. 18	8629	30	2	„	2+1	6·7	
„ 19	30	„	1	„	=2	6·8	
„ 23	8634	60	„	„	2−2, 3+4	7·2	

(4847) S VIRGINIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1909.							
Dec. 3	8644	30	1	Ry.	2 −3, 3+6	7·2	
„ 8	49	„	„	„	2−3, 3+1	7·4	
„ 22	63	60	„	„	3−1	7·9	
„ 28	69	„	„	„	3−4, 4+1	8·3	
1910.							
Jan. 11	8683	t.30	„	Bn.	5−1, 6−1·5, 7+4, 8+3	9·1	
May 2	8794	T.95	„	„	23+1	11·9	
„ 7	8799	183	„	Ma.	23−1	12·1	
„ 15	8807	„	2	„	..	<10·5	Not seen.
June 14	8837	T.120	1	Bn.	<16	<10·7	„
Dec. 27	9033	t.30	„	„	2−9, 3+1·5	7·7	
1911.							
Jan. 6	43	„	„	„	3+2	7·6	
„ 9	46	„	„	„	2−9, 3+1·5	7·7	
„ 28	65	60	2	Go.	4−2, 5+4	8·6	
„ 31	68	T.25	1	Bn.	3−4·5, 4+1	8·3	
Feb. 4	72	60	„	Go.	4−2, 6+4	8·6	
„ 21	89	„	„	„	4−3·5, 6+2	8·8	
Mar. 2	9098	„	„	„	6−2, 8+2	9·2	
„ 4	9100	T.50	„	Bn.	8+1	9·3	
Apr. 23	50	t.85	„	„	23+2	11·8	
May 4	61	T.120	„	„	23+2	11·8	
„ 24	9181	T.150	„	„	23−3	12·3	
June 30	9218	60	„	Go.	<16	<10·7	Not seen.
July 16	34	„	„	„	<18	<11·3	„
„ 26	44	„	„	„	<19	<11·5	„
Aug. 14	63	„	„	„	=19	11·5	About, glimpsed.
Sept. 11	9291	„	2	„	<15	<11·1	Not seen.
1912.							
Feb. 12	9445	„	1	„	7+1, 8−1	9·5	
„ 18	51	„	„	„	7+1, 8−1	9·5	
„ 25	58	„	„	„	7−3, 12+6	9·9	
Mar. 9	71	40	„	La.	12−1, 16+2	10·6	
„ 10	72	60	„	Go.	8−9, 12+1·5	10·3	
„ 11	73	40	2	La.	=12	10·5	
„ 14	76	„	„	„	12−1, 16+2	10·6	
„ 17	9479	„	„	„	12−2, 16+2	10·6	

(4847) S VIRGINIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Mar. 24	9486	60	1	Go.	12−3, 16−2, 18+6	10·8	
,, 25	9487	40	,,	La.	16−4, 18+2	11·1	
Apr. 7	9500	60	2	Go.	16−3	11·0	
,, 8	01	40	1	La.	=18	11·3	
,, 10	03	,,	2	,,	16−4, 18+1·5	11·1	
,, 14	07	60	1	Go.	=18	11·3	
,, 23	16	40	,,	La.	<18	<11·3	Not seen.
May 6	29	,,	,,	,,	<19	<11·5	,, ,,
June 2	9556	T.120	,,	Bn.	23−3	12·3	
Sept. 25	9671	38	3	Gd.	<18	<11·3	Not seen.
Nov. 13	9720	20	1	La.	2−3·5, 3+7	7·1	
,, 25	32	,,	,,	,,	2−4, e+1·5	7·2	
Dec. 3	40	,,	,,	,,	=e	7·3	
,, 5	42	,,	,,	,,	2−2, e+4	7·0	
,, 7	44	,,	,,	,,	2−3·5, e+2	7·1	Orange.
,, 9	46	,,	,,	,,	=e	7·3	
,, 11	48	,,	,,	,,	2−3, e+3	7·1	
1913.							
Jan. 4	72	25	,,	Wd.	e−3, 3+1	7·7	
,, 6	74	20	,,	La.	=e	7·3	
,, 12	80	,,	,,	,,	e−1·5, 3+3	7·5	
,, 14	82	25	,,	Wd.	e−3, 3+1	7·7	
,, 19	87	,,	,,	,,	e−3, 3+1	7·7	
,, 31	9799	,,	,,	,,	=3	7·8	
Feb. 9	9808	20	,,	La.	=4	8·4	
,, 11	10	25	,,	Wd.	3−2, 4+4	8·0	
,, 13	12	20	,,	La.	4−1, 5+5	8·5	
,, 15	14	,,	,,	,,	=4	8·4	
,, 15	14	25	,,	Wd.	=4	8·4	
,, 28	27	,,	,,	,,	4−4, 5+2	8·8	
Mar. 1	28	20	,,	La.	4−1, 5+4	8·6	
,, 2	29	60	,,	Go.	4−6, =6, 7+6	9·0	
,, 3	30	20	,,	La.	4−2, 5+4	8·6	
,, 3	30	25	,,	Wd.	5+2, 6+2	8·8	
,, 11	38	40	,,	La.	=5, 7+5	9·0	
,, 12	39	25	,,	Wd.	6−3, 7+3	9·3	
,, 15	42	,,	,,	,,	6−4, 7+2	9·4	
,, 16	43	60	,,	Go.	=6	9·0	
,, 17	44	25	,,	Wd.	6−4, 7+2	9·4	
Apr. 3	61	,,	,,	,,	7−3, 9+3	9·8	
,, 6	64	40	,,	La.	7−3, 9+1	9·9	
,, 12	70	25	,,	Wd.	9−2, 12+2	10·3	
,, 15	73	40	2	La.	7−3·5, 9+1	10·0	
,, 23	81	45	,,	Bh.	7−3, 9+3	9·8	
,, 26	9884	25	1	Wd.	12−4, 15+2	10·9	

(4847) S VIRGINIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Apr. 27	9885	60	1	Go.	12−1, 16+1	10·6	
,, 27	85	45	2	Bh.	8−5, =9, =10, 12+5	10·0	
,, 28	86	40	1	La.	12−1, 16+1	10·6	
May 1	89	,,	2	,,	=16	10·7	
,, 2	90	45	,,	Bh.	14−4, =11, 18+8	10·4	
,, 5	93	40	,,	La.	16−2, 18+4	10·9	
,, 6	94	T.95	1	Bn.	16−3, 18+2	11·1	
,, 7	95	40	,,	La.	16−4, 18+2	11·1	
,, 8	96	25	,,	Wd.	15−1	11·2	
,, 9	97	40	,,	La.	16−5, =18	11·3	
,, 11	9899	45	,,	Bh.	11−2, =12, 16+2	10·5	
,, 16	9904	90	2	,,	14−6, =16, 18+6	10·7	
,, 21	09	,,	,,	,,	12−5, 16−2, 18+4, 19+5	11·0	
,, 24	12	40	,,	La.	18−2, 19−2	11·6	Very difficult.
,, 28	16	,,	1	,,	23+2	11·8	Doubtful.
,, 30	18	90	2	Bh.	18+1, 19+3	11·2	
,, 31	19	T.150	1	Bn.	23+4	11·6	
June 3	22	,,	2	,,	=23	12·0	About.
,, 7	26	90	1	Bh.	18−1, 19+1	11·4	
,, 14	33	150	2	,,	18−2, =19	11·5	
,, 27	9946	90	,,	,,	18−3, =20, =21, 23+3	11·7	
Oct. 22	0063	,,	1	,,	<16	<10·7	Not seen.
,, 29	70	,,	2	,,	12−3, =16, 18+5	10·8	
Nov. 5	77	,,	1	,,	=12, =16	10·6	
,, 8	80	,,	,,	,,	7−8, =12, 16+4	10·4	
,, 16	88	,,	,,	,,	8−5, 12+5	9·9	
,, 21	93	,,	,,	,,	4−6, =6, 7+6	9·0	
,, 26	0098	20	,,	La.	3−4, 4+2	8·2	
,, 28	0100	90	,,	Bh.	3+2	7·6	
,, 30	02	20	,,	La.	e−3, 3+2	7·6	
Dec. 5	07	,,	2	,,	2−8, 3+3	7·6	
,, 9	11	45	1	Bh.	2−4, 3+6	7·2	
,, 10	12	20	,,	La.	2−4, =e, 3+5	7·3	Orange.
,, 12	14	45	,,	Bh.	1−10, 2−2, 3+6	7·1	
,, 21	23	20	2	La.	=2, e+4	6·9	
,, 23	25	45	1	Bh.	2−3·5, 3+7	7·1	
,, 25	27	20	,,	La.	2−3, e+2	7·1	
,, 29	31	45	,,	Bh.	2−6, 3+4	7·4	
,, 31	33	,,	,,	,,	2−6, 3+4	7·4	
1914.							
Jan. 5	38	,,	,,	,,	2−8, 3+2	7·6	
,, 6	39	T.25	,,	Bn.	2−7, 3+3·5	7·5	
,, 11	44	45	2	Bh.	=3	7·8	
,, 18	51	,,	,,	,,	3−1·5	8·0	
,, 22	55	60	,,	Th.	=3	7·8	
,, 23	56	20	1	La.	=3, 4+5	7·9	
,, 23	0156	90	2	Bh.	3−2	8·0	

(4847) S VIRGINIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Feb. 2	0166	25	1	Wd.	=3	7·8	
,, 3	67	90	,,	Bh.	3−4, 4+2	8·2	
,, 3	67	20	,,	La.	3−4, 4+2	8·2	
,, 4	68	T.50	,,	Bn.	3−4, 4+2	8·2	
,, 15	79	90	,,	Bh.	3−5, 4+1	8·3	
,, 17	81	25	,,	Wd.	3−3, 4+3	8·1	
,, 22	86	90	2	Bh.	4−2·5, 5+3	8·7	
,, 25	89	25	1	Wd.	4−2	8·6	
,, 27	91	90	,,	Bh.	4−6, =5, =6, 7+6	9·0	
,, 28	92	T.50	,,	Bn.	=5	9·0	
Mar. 3	0195	25	,,	Wd.	4−4, 6+2	8·8	
,, 12	0204	90	2	Bh.	4−2, 6+4	8·6	
,, 14	06	40	1	Bc.	=6, m+3	9·0	
,, 16	08	90	2	Bh.	6−4, 7+2	9·4	
,, 16	08	45	1	Br.	6−2, 8+2	9·2	
,, 21	13	25	,,	Wd.	=7	9·6	About.
,, 22	14	90	,,	Bh.	6−3, 7+3	9·3	
,, 22	14	T.50	,,	Bn.	5−3, 8+1	9·3	
,, 25	17	90	,,	Bh.	6−4, 7+1	9·4	
,, 28	20	40	,,	Bc.	4−2, =k	8·6	
,, 30	22	25	,,	Wd.	=9	10·1	
,, 31	23	40	2	La.	7−1, 8−2	9·6	
Apr. 1	24	90	,,	Bh.	7−5, 12+5	10·0	
,, 2	25	60	,,	La.	7−4, =9, 12+3	10·1	
,, 5	28	40	1	Bc.	m−1, =8	9·4	
,, 9	32	,,	,,	,,	8−2, o+1	9·6	
,, 12	35	150	,,	Bh.	7−6, 12+3	10·2	
,, 13	36	60	2	La.	8−4, 9−4, =10, 11+3	10·1	
,, 21	44	,,	1	,,	11−1, =12, 16+3	10·4	
,, 21	44	40	,,	Bc.	o−1, 14+2	9·8	
,, 22	45	90	2	Bh.	12−1, 16+1	10·6	
,, 22	45	25	1	Wd.	9−2, 12+2	10·3	
,, 24	47	60	,,	La.	11−1·5, 12−1, 16+3	10·5	
,, 25	48	T.95	,,	Bn.	10−1, 11+1	10·2	
,, 30	53	90	,,	Bh.	12−2, 14−6, 18+6, 19+8	10·7	
,, 30	53	60	2	La.	11−2, 12−1, 16+2	10·5	
May 9	62	90	,,	Bh.	16−3, 18+3	11·0	
,, 14	67	60	,,	La.	16−3, 18+3	11·0	
,, 15	68	90	1	Bh.	16−4, =18, 19+4	11·2	
,, 16	69	T.50	,,	Bn.	14−10, 18+3	11·0	
,, 20	73	25	,,	Wd.	=15	11·1	About.
,, 24	77	60	2	La.	=15, 16−3	11·0	
,, 25	78	150	,,	Bh.	16−3, 18+3	11·0	
,, 26	79	T.95	1	Bn.	19+1	11·4	
,, 29	82	60	2	La.	15−3, 19+2	11·3	
June 10	94	90	1	Bh.	18−2, =19, 20+2	11·5	
,, 11	95	60	2	La.	19−3, 23+2	11·8	
,, 13	0297	150	1	Bh.	=19	11·5	
,, 23	0307	,,	,,	,,	16−9, =19, 23+4·5	11·6	
,, 23	0307	60	2	La.	23−2	12·2	Difficult.

(4847) S VIRGINIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Oct. 16	0422	90	1	Bh.	12−1, 16+1	10·6	
„ 30	36	„	2	„	7−8, =12, 16+4	10·4	
Nov. 3	40	„	„	„	8−3·5, 12+7	9·8	
„ 10	47	„	1	„	4−6, =6, 7+6	9·0	
„ 16	53	45	„	„	2−8, 3+2	7·6	
„ 18	55	20	„	La.	3−1, 4+4	8·0	
„ 20	57	90	„	Bh.	2−7, 3+3·5	7·5	
„ 26	63	45	„	„	2−2, 3+8	7·0	Dull red.
„ 28	65	20	„	La.	2−2, 3+8	7·0	
Dec. 1	68	45	„	Bh.	1−4, 2+2	6·5	
„ 12	79	„	2	„	1−3, 2+3	6·4	
„ 18	85	„	„	„	1+1, 2+5	6·1	
„ 21	88	„	1	„	1+1·5	5·9	In F. 6·1.
„ 23	90	„	„	„	1+1·5	5·9	Dull orange.
„ 26	93	„	„	„	1+2	5·9	„ „
„ 27	94	20	„	La.	b−1·5, c+3	5·8	Orange.
„ 31	0498	45	„	Bh.	1+3, 2+10	5·8	

(5194) V BOÖTIS. (V. 5.)

H.D. 142539.

NOTES.

Star P = B.D. + 39° 2760, 7·17 m. P.D.M.

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
Jan. 6	9043	t.60	1	Bn.	=9, 13+1	9·1	
„ 9	46	t.30	„	„	9−1, 13+0·5	9·2	
„ 31	68	T.25	„	„	16−1, 17+0·5	9·9	
„ 31	68	30	2	Gh.	=16, =17	9·9	
Feb. 25	9093	T.25	1	Bn.	9−1, 13+0·5	9·2	Doubtful. [C.L.B.]
Mar. 9	9105	T.95	„	„	25+1	11·3	
Apr. 3	30	T.50	„	„	=25	11·4	
„ 20	47	t.60	2	„	16−0·5, 17+1	9·8	
„ 23	50	„	1	„	13−4, 16+1·5	9·6	
May 8	65	T.25	„	„	6−1, 7+1	8·7	
„ 9	66	45	2	Br.	5−2, 11+5	8·7	
„ 15	72	t.30	1	Bn.	4−5, 5+1	8·5	
„ 21	9178	„	„	„	4−4, 5+1	8·4	

(5194) V BOÖTIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
May 22	9179	45	1	Br.	3−4, 5+5	8·0	
„ 22	79	„	„	Bi.	=4	8·0	
„ 24	81	t.30	„	Bn.	3−2, 4+1·5	7·8	
„ 28	85	45	„	Bi.	3−1, 4+2	7·8	Reddish.
„ 29	86	t.30	„	Bn.	2−12, 3+1	7·5	
„ 30	87	45	„	Bi.	3+1	7·5	
June 1	89	t.30	„	Bn.	3+2	7·4	
„ 3	91	45	„	Bi.	3+1	7·5	
„ 6	94	t.30	„	Bn.	2−10, 3+2	7·4	
„ 7	95	45	„	Bi.	3+1	7·5	
„ 9	97	„	„	„	2−10, 3+3	7·3	
„ 10	9198	„	„	„	3+2	7·4	
„ 15	9203	„	„	„	3+3	7·3	
„ 17	05	T.25	„	Bn.	3+2	7·4	
„ 19	07	45	„	Br.	2−9, 3+3	7·3	
„ 20	08	„	„	Bi.	3+3	7·3	
„ 25	13	30	„	Gh.	=3	7·6	
„ 26	14	45	„	Bi.	3+3	7·3	Red.
„ 27	15	t.30	„	Bn.	2−11, 3+1	7·5	
July 2	20	45	„	Bi.	2−9, 3+4	7·2	
„ 5	23	t.30	„	Bn.	3+1	7·5	
„ 10	28	„	„	„	3−0·5	7·7	
„ 10	28	10	„	Cr.	=3	7·6	
„ 12	30	30	„	Gh.	=3	7·6	
„ 12	30	45	„	Bi.	3+2	7·4	
„ 18	36	„	2	„	3+2	7·4	
„ 18	36	30	1	Gh.	=3	7·6	
„ 20	38	90	„	Bh.	3−2, 4+2	7·8	
„ 21	39	60	„	Br.	3+3	7·3	
„ 21	39	10	„	Cr.	=4	8·0	
„ 22	40	T.25	„	Bn.	3−2·5, 5+7	7·9	
„ 24	42	45	„	Bi.	=3	7·6	
„ 25	43	10	„	Cr.	=4	8·0	
„ 25	43	30	„	Ln.	3−6, 11+12	8·1	
„ 27	45	50	„	Gi.	=3	7·6	
„ 27	45	30	„	Gh.	3−5, 5+5	8·1	
„ 27	45	„	2	Ln.	3−6, 5+3	8·2	
„ 28	46	45	1	Bi.	=3	7·6	
„ 30	48	30	„	Ln.	5+4	8·2	
„ 31	49	t.30	„	Bn.	3−2, 4+1·5	7·8	
Aug. 1	50	30	„	Ln.	11+9	8·3	
„ 3	52	45	„	Br.	3−3	7·9	
„ 3	52	50	„	Gi.	3−2, 4+1	7·9	
„ 7	56	„	„	„	3−2, 4+2	7·8	
„ 8	57	30	2	Ln.	3−9, 5−1, 11+8	8·5	
„ 11	60	45	1	Bi.	3−2, 4+1	7·9	
„ 13	62	30	„	Ln.	3−9, 11+6	8·6	
„ 14	63	90	2	Bh.	=9, =10	9·1	
„ 16	65	30	1	Ln.	3−7, 11+7	8·4	
„ 16	65	40	2	Gi.	=4	8·0	
„ 17	66	45	1	Bi.	3−2, 4+1	7·9	
„ 18	67	10	„	Cr.	5−2, 9+2	8·8	
„ 22	9271	45	„	Bi.	3−3, =4	8·0	

(5194) V BOÖTIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
Aug. 25	9274	30	1	Ln.	5−2, 11+4	8·8	
„ 25	74	„	2	Gh.	5−4, 11+2·5	8·9	
„ 25	74	40	„	Gi.	4−2, 6+4	8·2	
„ 28	77	45	1	Br.	5−1, 9+5	8·6	
„ 30	79	30	„	Ln.	5−3, 11+1	9·0	
Sept. 1	81	„	„	„	11+1	9·1	
„ 2	82	„	„	Gh.	5−2, =7, 9+2	8·8	
„ 4	84	50	2	Gi.	4−2, 6+4	8·2	
„ 6	86	60	1	Br.	=6	8·6	
„ 6	86	30	2	Ln.	=11	9·2	About.
„ 10	90	90	1	Bh.	9−1, 11+1, =15	9·2	
„ 13	93	50	2	Gi.	=7	8·8	
„ 15	95	30	„	Ln.	5−4, 8−1, 11−1	9·1	
„ 17	97	60	1	Br.	9+2	8·9	
„ 18	98	30	„	Gh.	5−4, 12+3	9·0	
„ 18	98	40	„	Gi.	=6	8·6	
„ 18	9298	45	„	Bi.	5−1, 7+1	8·7	
„ 20	9300	90	„	Bh.	14−2, 16+2, =17	9·7	
„ 25	05	40	„	Gi.	7−2, 8+2	8·8	
„ 26	06	34	„	Cr.	9+2	8·9	
„ 26	06	45	„	Bi.	=9, 11+1	9·1	
„ 26	06	T.50	„	Bn.	=9, 13+1	9·1	
Oct. 10	20	30	„	Gh.	=8, =9	9·0	
„ 16	26	90	„	Bh.	=17	10·0	
„ 27	37	45	„	Br.	17−1, 19+3	10·1	
„ 31	41	t.60	2	Bn.	=19	10·4	About.
Nov. 8	49	160	1	Br.	19−2, 23+5	10·6	
„ 16	57	40	2	Gi.	17−4, 19+2	10·3	Difficult.
„ 17	58	T.50	1	Bn.	=20	10·6	
„ 20	61	60	„	Br.	20−5, 23+2	11·0	
„ 29	70	T.95	„	Bn.	23+1	11·1	
Dec. 1	72	40	„	Gi.	21−2, 23+2	11·0	
„ 9	80	160	2	Br.	23+2	11·0	About. Difficult.
„ 18	9389	40	„	Gi.	21−3, 23+3	11·0	Difficult.
„ 29	9400	„	„	„	20−2, =21	10·8	
1912.							
Jan. 1	03	„	„	„	=19, 20+2	10·4	
„ 10	12	„	1	„	=17	10·0	
„ 28	30	T.25	„	Bn.	3−7, 5+1	8·4	
Feb. 2	35	t.22	„	Bl.	3−6, 5+3	8·2	
„ 8	41	45	„	Br.	3−3, 5+6	7·9	
„ 10	43	t.22	„	Bl.	3−1, 5+7	7·8	
„ 14	47	57	2	Bh.	3−2, 4+2	7·8	
„ 18	51	t.22	„	Bl.	3−1, 5+7	7·8	
„ 19	52	57	„	Bh.	3−2, 4+1	7·9	
„ 23	56	„	1	„	3−2, 4+1	7·9	Orange.
„ 23	56	45	2	Br.	3+3	7·3	
„ 26	59	57	1	Bh.	3−5, =4, 6+5	8·1	
„ 29	9462	„	2	„	3−5, =4, 6+5	8·1	Dull red.

(5194) V BOÖTIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Mar. 6	9468	45	1	Br.	=3	7·6	
„ 6	68	57	„	Bh.	3−5, =4, 6+5	8·1	Red.
„ 8	70	20	„	La.	3−1, 4+2	7·8	
„ 8	70	57	2	Bh.	=4	8·0	Orange red.
„ 9	71	20	1	La.	3−1, 4+2	7·8	
„ 10	72	57	2	Bh.	=5, =6	8·6	
„ 12	74	20	1	La.	3−2, 4+1	7·9	
„ 13	75	40	„	Gi.	=3	7·6	
„ 14	76	20	2	La.	3−2, 4+1	7·9	
„ 15	77	40	1	Gi.	=3	7·6	
„ 15	77	57	„	Bh.	=5	8·6	
„ 18	80	„	„	„	4−3, 5+3	8·3	Reddish orange.
„ 19	81	40	„	Gi.	3−1, 4+3	7·7	
„ 19	81	20	„	La.	3−2, 4+1	7·9	
„ 20	82	45	„	Br.	2−10, 3+2	7·4	
„ 20	82	t.22	„	Bl.	3−1·5, 5+8	7·8	
„ 23	85	40	„	Gi.	3−1, 4+3	7·7	
„ 23	85	20	2	La.	=4	8·0	
„ 23	85	57	1	Bh.	4−4, 5+1	8·4	Orange red.
„ 28	90	„	2	„	=5, =6	8·6	
„ 29	91	40	1	La.	4−2, 5+4	8·2	
„ 30	92	„	„	Gi.	3−2, 4+3	7·8	
„ 31	93	57	2	Bh.	4−4, 5+1	8·4	
Apr. 1	94	t.22	1	Bl.	3−1, 5+7	7·8	
„ 2	95	57	„	Bh.	=5, =6	8·6	Pale orange.
„ 3	96	T.25	„	Bn.	3−3, 5+6	7·9	
„ 3	96	40	2	Gi.	3−3, 4+3	7·8	
„ 3	96	t.22	1	Bl.	3−5, 5+5	8·1	
„ 6	9499	20	„	La.	=4	8·0	
„ 8	9501	40	„	Gi.	3−2, 4+2	7·8	
„ 8	01	45	„	Bh.	=5, =6	8·6	Orange yellow.
„ 10	03	20	„	La.	4−2, 5+4	8·2	
„ 12	05	45	„	Bh.	=5, =6	8·6	Orange.
„ 13	06	„	„	Br.	5+3	8·3	
„ 16	09	„	„	Bh.	=5, =6	8·6	Orange.
„ 19	12	„	„	„	=5, =6	8·6	
„ 21	14	„	„	„	=5, =6	8·6	
„ 21	14	t.22	„	Bl.	3−3·5, 5+6	8·0	
„ 22	15	40	2	Gi.	3−2·5, 4+2	7·8	
„ 22	15	20	1	La.	4−2, 5+4	8·2	
„ 25	18	45	2	Bh.	4−3, 5+3	8·3	
„ 26	19	20	„	La.	4−3, 5+3	8·3	
„ 29	22	t.30	1	Bn.	3−4, 5+4	8·1	
„ 29	22	45	2	Bh.	=4	8·0	
May 1	24	t.22	1	Bl.	3−4, 5+5	8·0	
„ 3	26	40	„	Gi.	3−3, 4+2	7·9	
„ 6	29	„	„	„	3−4, 4+2	7·9	
„ 9	32	20	2	La.	4−3, 5+2	8·3	
„ 11	34	40	1	Gi.	3−2, 4+1	7·9	
„ 13	36	t.22	„	Bl.	3−8, 5+1·5	8·4	
„ 14	37	45	2	Bh.	=5, =6	8·6	Dull red.
„ 15	38	40	1	Gi.	=4	8·0	
„ 18	41	„	„	„	=4, 6+3	8·1	
„ 20	9543	45	„	Bh.	=7	8·8	

(5194) V BOÖTIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
May 21	9544	t.22	1	Bl.	=5	8·6	
,, 23	46	45	2	Bh.	=7	8·8	
,, 28	51	,,	,,	,,	=5, =6	8·6	
,, 30	53	t.22	1	Bl.	3−8, 5+1·5	8·4	
,, 31	54	40	,,	La.	5−2, 9+3	8·8	
,, 31	54	45	2	Bh.	=5, =6	8·6	
June 2	56	40	1	Gi.	4−2·5, 6+2	8·3	
,, 2	56	T.25	,,	Bn.	6−1, =7	8·7	
,, 5	59	,,	,,	,,	5−1	8·7	
,, 5	59	20	,,	La.	=6	8·6	
,, 6	60	45	,,	Br.	5−3, 9+1	8·9	
,, 6	60	,,	2	Bh.	=7	8·8	
,, 7	61	40	1	Gi.	4−3, 6+2	8·3	
,, 9	63	45	2	Bh.	=8	8·9	
,, 10	64	t.30	1	Bn.	3−7·5, 5+2	8·4	
,, 10	64	30	,,	Gh.	=11	9·2	
,, 14	68	40	,,	Gi.	=7, 11+4	8·8	
,, 14	68	45	,,	Bh.	5−2, =8, 9+2	8·8	
,, 17	71	40	,,	Gi.	6−1, 7+0·5	8·7	
,, 19	73	45	,,	Bh.	5−2, =8, 9+2	8·8	
,, 20	74	30	2	Gh.	9−3, 11−3, 16+4, 17+5	9·4	
,, 21	75	t.30	1	Bn.	=7, =8	8·8	
,, 23	77	60	,,	Br.	=9	9·1	
,, 25	79	40	,,	Gi.	=9, =11	9·1	
,, 27	81	T.94	,,	Bl.	11−1, 16+5	9·3	
,, 29	83	45	,,	Bh.	9−4, 11−4, 16+4, 17+4	9·5	
July 2	86	40	2	La.	8−1, 9+0·5	9·0	
,, 4	88	45	,,	Bh.	14−2, =15, 16+2	9·6	
,, 8	92	90	,,	,,	=16, =17	9·9	
,, 8	92	T.50	1	Bn.	16−1, 17+0·5	9·9	
,, 8	92	40	,,	Gi.	11−3, 16+1·5	9·6	
,, 9	93	T.94	,,	Bl.	=16	9·8	
,, 11	95	90	2	Bh.	16−2, =17, 18+2	10·0	
,, 12	96	40	,,	Gi.	11−4, 16+1	9·6	
,, 13	97	,,	,,	La.	19−5, 25+5	10·9	Doubtful. [C.L.B.]
,, 14	98	T.50	1	Bn.	16−1·5	9·9	
,, 15	9599	45	2	Bh.	16−2, =17, 18+2	10·0	
,, 17	9601	40	1	Gi.	16−2, 20+1	10·2	
,, 17	01	T.94	,,	Bl.	16−7·5, 21+3	10·5	
,, 18	02	45	,,	Br.	19−5, 25+5	10·9	
,, 22	06	40	2	La.	20−2	10·8	
,, 23	07	,,	,,	Gi.	=20	10·6	
,, 23	07	T.94	1	Bl.	16−8, 21+2·5	10·6	
,, 25	09	90	2	Bh.	19−2, =20, 21+2	10·6	
,, 27	11	,,	,,	,,	=19, =20	10·5	
,, 30	14	T.94	1	Bl.	16−9, 21+1·5	10·7	
,, 31	15	40	,,	Gi.	=21	10·8	
Aug. 1	16	T.94	,,	Bl.	16−9·5, 21+2	10·7	
,, 2	17	90	2	Bh.	=18, =19, =20	10·4	
,, 5	20	40	,,	La.	20−3	10·9	Glimpsed.
,, 5	9620	,,	1	Gi.	20−2, 21+1	10·7	

(5194) V BOÖTIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Aug. 8	9623	40	2	Gi.	20−3, 21+1	10·8	
,, 11	26	45	1	Bh.	19−3, =21, 22+3	10·7	
,, 12	27	40	,,	Gi.	20−3, 21+1	10·8	
,, 12	27	,,	2	La.	=25	11·4	
,, 17	32	,,	1	Gi.	20−3, 21+1	10·8	
,, 20	35	45	,,	Bh.	19−3, 20−1, 21+1, 22+3	10·7	
,, 26	41	,,	2	,,	=18, =19	10·3	
,, 29	44	,,	,,	,,	18−2, =19, 20+2	10·4	
,, 29	44	40	,,	Gi.	16−3, 20+1	10·3	
Sept. 2	48	45	,,	Br.	=19	10·4	
,, 2	48	T.50	1	Bn.	17−2	10·2	
,, 2	48	45	2	Bh.	17−3, =18, 20+3	10·2	
,, 3	49	40	,,	La.	19−1	10·5	
,, 4	50	T.94	1	Bl.	16−6·5, 21+4	10·4	
,, 5	51	40	2	Gi.	16−2, 20+1	10·2	
,, 5	51	,,	1	La.	16−1, 19+4	9·9	
,, 5	51	45	2	Bh.	17−2, =18, 19+2	10·2	
,, 7	53	40	,,	Gi.	16−1, 20+2	10·1	
,, 13	59	,,	,,	,,	11−3·5, 16+1	9·6	
,, 13	59	T.94	,,	Bl.	11−3, 16+2	9·5	
,, 14	60	40	,,	La.	=16	9·8	
,, 16	62	,,	1	,,	13−2, 16+2	9·5	
,, 17	63	,,	2	Gi.	11−1, 16+3	9·4	
,, 17	63	45	,,	Bh.	9−2, =11, 15+2	9·2	
,, 18	64	40	1	La.	9−1, 13+1	9·1	
,, 20	66	45	,,	Br.	=9	9·1	
,, 20	66	,,	,,	Bh.	7−2, 8−1, 9+1, 11+2	9·0	
,, 21	67	t.22	,,	Bl.	5−5, 11+1	9·1	
,, 22	68	T.50	,,	Bn.	=7	8·8	
,, 24	70	45	2	Bh.	5−2, =8, 9+2	8·8	
,, 26	72	t.22	1	Bl.	5−2, 11+5	8·7	
,, 27	73	45	2	Bh.	=6	8·6	
,, 28	74	40	,,	La.	5−2, 9+3	8·8	
,, 30	76	45	,,	Bh.	=6, =7	8·7	
Oct. 2	78	T.50	1	Bn.	5+1	8·5	
,, 2	78	40	2	Gi.	4−3, 6+2	8·3	
,, 2	78	45	1	Bh.	=5, =6	8·6	
,, 2	78	t.22	2	Bl.	3−8, 5+1	8·4	
,, 2	78	30	1	Tn.	=5	8·6	
,, 4	80	45	2	Bh.	=5	8·6	
,, 5	81	t.22	,,	Bl.	3−8, 5+1	8·4	
,, 6	82	t.30	1	Bn.	3−7, 5+1	8·4	
,, 7	83	45	,,	Bh.	3−6, =4, 6+3	8·2	
,, 8	84	30	,,	Tn.	=6	8·6	
,, 9	85	t.22	,,	Bl.	3−8, 5+1·5	8·4	
,, 10	86	45	,,	Br.	3−6, 5+3	8·2	
,, 10	86	t.30	,,	Bn.	3−6, 5+2	8·3	
,, 10	86	40	,,	Gi.	4−1, 6+3, 7+4	8·2	
,, 10	86	30	2	Tn.	3−8, 6+2	8·4	
,, 11	87	20	1	La.	4−2, 5+3	8·2	
,, 11	87	45	2	Bh.	3−5, =4, 6+5	8·1	
,, 14	90	20	1	La.	4−3, 5+3	8·3	
,, 15	9691	t.22	,,	Bl.	3−6, 5+2	8·3	

(5194) V BOÖTIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Oct. 17	9693	t.30	1	Bn.	3−6, 5+3	8·2	
,, 17	93	45	2	Bh.	3−5, =4, 6+5	8·1	
,, 17	93	20	,,	La.	4−2, 5+4	8·2	
,, 17	93	30	1	Tn.	3−6·5, 6+3	8·3	
,, 19	95	20	,,	La.	4−3, 5+3	8·3	
,, 20	96	40	,,	Gi.	3−3, 4+2	7·9	
,, 22	9698	45	2	Bh.	3−3, 6+6	7·9	
,, 25	9701	,,	,,	,,	3−2·5, 6+7	7·9	
,, 26	02	20	,,	La.	3−3, 4+1	7·9	
,, 28	04	,,	1	,,	=4	8·0	
,, 29	05	45	,,	Br.	=3	7·6	
,, 29	05	,,	2	Bh.	=3	7·6	
Nov. 1	08	40	,,	Gi.	3−3, 4+2	7·9	
,, 1	08	20	1	La.	3−2, 4+1	7·9	
,, 3	10	T.50	,,	Bn.	3−6, 5+3	8·2	
,, 3	10	45	2	Bh.	3−2·5, =4, 7+9	7·9	Red.
,, 3	10	t.22	1	Bl.	3−2, 5+6	7·9	
,, 7	14	45	2	Bh.	3−5, =4, 6+5	8·1	
,, 7	14	20	1	La.	3−2, 4+1	7·9	
,, 11	18	45	2	Bh.	=4	8·0	
,, 12	19	t.22	1	Bl.	3−8, 5+1·5	8·4	
,, 13	20	t.30	,,	Bn.	3−7, 5+2·5	8·3	
,, 13	20	20	,,	La.	=4	8·0	
,, 24	31	45	2	Bh.	4−5, 5−2, 9+2, 10+5	8·7	
,, 25	32	20	1	La.	3−3, 4+1	7·9	
,, 29	36	45	2	Bh.	=7, =8	8·8	
,, 30	37	60	1	Br.	3−3, 5+5	8·0	
,, 30	37	T.50	,,	Bn.	3−6, 5+3	8·2	
Dec. 3	40	20	,,	La.	3−3, =4	8·0	
,, 4	41	40	2	Gi.	3−2·5, 4+3	7·8	
,, 4	41	t.22	,,	Bl.	3−6, 5+3	8·2	
,, 5	42	45	1	Bh.	3−5, 5+5	8·1	
,, 5	42	20	,,	La.	=4	8·0	
,, 7	44	,,	2	,,	=4	8·0	
,, 9	46	40	1	Gi.	3−2, 4+3	7·8	
,, 11	48	45	,,	Bh.	3−6, 7+6	8·2	
,, 11	48	20	2	La.	=4	8·0	
,, 16	53	45	1	Bh.	=3	7·6	
,, 22	59	,,	2	,,	3+3	7·3	
,, 24	61	,,	,,	,,	2−8, 3+3	7·2	Dull red.
,, 27	64	,,	,,	,,	3+1	7·5	
,, 29	66	T.25	1	Bn.	=5, =6	8·6	Doubtful. [C.L.B.]
,, 31	68	45	2	Bh.	=3	7·6	
1913.							
Jan. 1	69	,,	1	Br.	=3	7·6	About.
,, 2	70	,,	,,	Bh.	=3	7·6	
,, 3	71	40	,,	Gi.	=3, 4+4	7·6	
,, 5	73	45	,,	Bh.	3−1	7·7	
,, 6	74	20	2	La.	=4	8·0	
,, 7	75	t.22	1	Bl.	3−1, 5+7	7·8	
,, 8	76	45	,,	Bh.	3+1	7·5	
,, 11	9779	,,	,,	,,	3+1	7·5	

(5194) V BOÖTIS—*continued.*

Date.		Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.								
Jan.	12	9780	40	1	Gi.	=3, 4+4	7·6	
,,	12	80	20	,,	La.	3−2, 4+2	7·8	
,,	17	85	45	,,	Bh.	3+2	7·4	
,,	18	86	,,	,,	Br.	3−1·5	7·8	
,,	21	89	,,	2	Bh.	3+2	7·4	
,,	25	93	,,	,,	,,	3+2	7·4	
,,	31	9799	,,	1	,,	3+1	7·5	
Feb.	3	9802	40	,,	Gi.	3−3, 4+3	7·8	
,,	4	03	45	,,	Bh.	3−4, =4	8·0	
,,	5	04	,,	,,	Br.	3−5, 5+5	8·1	
,,	5	04	t.22	,,	Bl.	3−5, 5+5	8·1	
,,	8	07	45	,,	Bh.	3−5, 5+5, 6+5	8·1	
,,	10	09	,,	,,	,,	3−6, 5+2, 6+3	8·3	
,,	10	09	20	,,	La.	4−2, 5+2	8·3	
,,	12	11	45	,,	Bh.	=5, =6	8·6	
,,	15	14	40	2	Gi.	=4, 6+3	8·1	
,,	16	15	45	1	Bh.	5−1, 6−1, 7+1	8·7	
,,	19	18	t.22	,,	Bl.	3−8, 5+1·5	8·4	
,,	21	20	45	,,	Bh.	=5, =6	8·6	
,,	23	22	40	2	La.	5−1·5, 9+3	8·7	
,,	24	23	t.22	1	Bl.	5−4, 11+2·5	8·9	
,,	26	25	45	,,	Br.	5−5, 11+1	9·1	
,,	27	26	,,	,,	Bh.	8−2, =9, =10, 11+2	9·0	
Mar.	3	30	,,	,,	,,	=9, =10, =11	9·1	
,,	3	30	40	,,	Gi.	=7, 11+2	8·9	
,,	4	31	20	,,	La.	=9, 11+2	9·0	
,,	5	32	t.22	,,	Bl.	11−1, 16+4·5	9·3	
,,	6	33	45	,,	Bh.	=9, =10	9·1	
,,	7	34	40	,,	La.	9−2, =11	9·2	
,,	8	35	45	,,	Bh.	9−2, =11, =12, 15+2	9·2	
,,	10	37	t.22	,,	Bl.	11−4, 16+2	9·6	
,,	11	38	45	,,	Br.	=9, =11	9·1	
,,	11	38	40	,,	Gi.	11−2, 13+2, 16+4	9·3	
,,	11	38	20	,,	La.	11−2, =13	9·3	
,,	11	38	45	,,	Bh.	11−7, =15, 20+7	9·7	
,,	15	42	,,	,,	,,	=14, =15	9·5	
,,	20	47	,,	,,	,,	11−3, =15, 16+3	9·5	
,,	25	52	t.22	,,	Bl.	16−4·5, 21+6	10·2	
,,	27	54	90	,,	Bh.	16−3, =17, 19+3	10·0	
,,	30	57	,,	,,	,,	15−5, 20+5	10·0	
,,	30	57	45	,,	Br.	16−1, 17+1	9·9	
,,	30	57	40	,,	La.	18−0·5, 19+1	10·3	
Apr.	1	59	t.22	,,	Bl.	16−6, 21+4·5	10·4	
,,	4	62	90	,,	Bh.	17−3, =18, 20+3	10·2	
,,	6	64	40	,,	La.	=19, 20+2	10·4	
,,	7	65	45	,,	Bh.	17−7, =20, 24+7	10·6	
,,	11	69	90	,,	,,	19−3, 20−1, 21+1, 22+3	10·7	
,,	13	71	t.22	,,	Bl.	16−9, 21+1·5	10·7	
,,	16	74	45	2	Bh.	20−1, =21	10·7	
,,	20	78	,,	,,	,,	19−2, =21, 22+2	10·7	
,,	23	81	,,	,,	,,	20−3, =21, 23+3	10·9	
,,	24	9882	T.94	1	Bl.	16−9, 21+1·5	10·7	

(5194) V BOÖTIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Apr. 27	9885	45	1	Br.	19−7, 25+2	11·1	
,, 27	85	,,	,,	Bh.	=22, =23	11·1	Bright red.
,, 28	86	40	2	La.	19−2	10·6	Glimpsed. Difficult.
May 1	89	,,	1	,,	19−3	10·7	
,, 1	89	30	,,	Gh.	=23, =25	11·3	
,, 2	90	90	,,	Bh.	21−1, 22+1	10·9	
,, 3	91	T.94	,,	Bl.	16−9, 21+1·5	10·7	
,, 4	92	90	2	Bh.	=20, 21+3	10·5	
,, 5	93	40	1	La.	19−5, =25	11·1	
,, 9	97	,,	,,	,,	19−6	11·0	
,, 9	97	45	,,	Br.	20−3, 23+3	10·9	
,, 10	98	24	,,	Bo.	20−2, 21+0·5	10·8	
,, 10	98	T.50	,,	Bn.	18−2·5, 20+1	10·5	
,, 10	98	30	,,	Gh.	=25	11·4	
,, 11	9899	45	,,	Bh.	17−3, =19, 20+2	10·3	
,, 12	9900	40	,,	Gi.	20−2, 21+2	10·7	
,, 13	01	T.95	,,	Bn.	25+1	11·3	
,, 14	02	T.94	,,	Bl.	16−7·5, 21+3	10·5	
,, 16	04	90	2	Bh.	=18, =19	10·3	
,, 21	09	24	1	Bo.	20−2, 21+0·5	10·8	
,, 21	09	45	,,	Bh.	17−4, =19, 22+8	10·3	
,, 24	12	40	,,	La.	19−2, 20−2, 23+4	10·7	
,, 25	13	45	,,	Br.	20−3, 23+3	10·9	
,, 25	13	40	,,	Gi.	=20	10·6	Difficult.
,, 25	13	t.22	,,	Bl.	16−5, 21+5	10·3	
,, 25	13	34	,,	Cr.	16−3, 19+3	10·1	
,, 25	13	45	2	Bh.	17−4·5, =20, 24+9	10·5	
,, 25	13	30	1	Gh.	=23	11·2	
,, 26	14	24	2	Bo.	20−0·5, 21+2	10·6	
,, 27	15	T.50	1	Bn.	17−10, 25+3	11·0	
,, 29	17	40	,,	Gi.	16−2·5, 20+1	10·2	
,, 30	18	45	2	Bh.	16−4, =18, 20+4	10·2	
,, 30	18	30	1	Gh.	=16, =17	9·9	
,, 31	19	24	2	Bo.	18−3, 20+1	10·5	
,, 31	19	T.94	1	Bl.	16−4·5, 21+6	10·2	
June 2	21	24	,,	Bo.	18−2·5, 20+1	10·5	
,, 2	21	40	,,	La.	16−3, 19+2	10·1	
,, 3	22	T.50	,,	Bn.	25+2	11·2	Doubtful. [C.L.B.]
,, 4	23	45	,,	Bh.	16−3, =17, 19+3	10·0	
,, 6	25	T.25	,,	Bn.	17−8, 25+5	10·8	
,, 7	26	45	,,	Br.	16−1, 17+1	9·9	
,, 7	26	,,	,,	Bh.	16−1, 17+1	9·9	
,, 8	27	40	,,	Gi.	=16	9·8	
,, 8	27	,,	,,	La.	11−4·5, 16+1	9·7	
,, 8	27	30	,,	Gh.	=16	9·8	
,, 11	30	40	2	Gi.	11−3, 16+1·5	9·5	
,, 12	31	,,	1	La.	11−5, =16	9·7	
,, 12	31	t.22	,,	Bl.	11−4, 16+1	9·6	
,, 14	33	24	,,	Bo.	=11, =13	9·2	
,, 15	34	t.22	,,	Bl.	11−4, 16+1	9·6	
,, 16	35	30	2	Gh.	=9	9·1	
,, 17	9936	34	1	Cr.	=11	9·2	

(5194) V BOÖTIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
June 17	9936	45	2	Bh.	9−2, 10−1, =11	9·2	
,, 19	38	24	1	Bo.	9−1, 11+0·5	9·1	
,, 21	40	45	,,	Bh.	9−1, 10−1, 11+1, 16+4	9·2	
,, 22	41	t.22	,,	Bl.	=11	9·2	
,, 23	42	40	,,	La.	8−3, 11+1	9·1	
,, 25	44	t.22	,,	Bl.	=11	9·2	
,, 27	46	24	2	Bo.	8−2, 9+0·5	9·0	
,, 27	46	T.25	,,	Bn.	=9, 11+3, 13+1	9·0	
,, 27	46	45	1	Bh.	9+1, 11+3	8·9	
,, 29	48	30	,,	Gh.	=9	9·1	
,, 30	49	24	,,	Bo.	8−1, =9	9·0	
,, 30	49	45	,,	Bh.	9+2, 11+3	8·9	
July 3	52	T.25	,,	Bn.	=7, 8+0·5	8·8	
,, 7	56	45	2	Bh.	6−3, 9+3, 10+1·5	8·8	
,, 7	56	t.22	1	Bl.	5−4·5, 11+2	9·0	
,, 11	60	T.25	,,	Bn.	6−1, 7+1	8·7	
,, 11	60	45	2	Bh.	=8, 9+3	8·8	
,, 12	61	20	,,	La.	5−3, 9+3, 11+2	8·9	
,, 20	69	T.25	1	Bn.	=5, =6	8·6	
,, 23	72	t.22	,,	Bl.	5−1, 11+5	8·7	
,, 24	73	15	2	Bo.	=4	8·0	
,, 25	74	45	1	Bh.	5+1, =6	8·5	
,, 26	75	40	,,	La.	4−4, 5+1	8·4	
,, 28	77	15	,,	Bo.	=4	8·0	
,, 29	78	T.25	,,	Bn.	3−7·5, 5+2	8·4	
,, 30	79	45	2	Bh.	3−7, 5+1, 6+2	8·4	
,, 30	79	t.22	1	Bl.	3−7, 5+2	8·3	
,, 31	80	15	,,	Bo.	4−3, 5+3	8·3	
Aug. 2	82	45	,,	Br.	=5	8·6	
,, 2	82	24	,,	Bo.	=5	8·6	
,, 2	82	34	,,	Cr.	4−3, 5+3	8·3	
,, 2	82	45	,,	Bh.	5+1, 6+1	8·5	
,, 2	82	24	,,	Wa.	=7, =8	8·8	
,, 6	86	45	,,	Bh.	4−2, 5+3	8·2	
,, 6	86	t.22	,,	Bl.	3−7, 5+2	8·3	
,, 9	89	45	,,	Bh.	4−3, 5+3	8·3	
,, 12	92	15	2	Bo.	4−3, 5+3	8·3	
,, 14	94	t.22	1	Bl.	3−6, 5+3	8·2	
,, 15	95	,,	,,	,,	3−8, 5+1·5	8·4	
,, 16	96	45	,,	Bh.	3−6, 5+3, 6+3	8·2	
,, 17	97	15	2	Bo.	4−3, 5+3	8·3	
,, 18	9998	24	1	Wa.	3−8, 7+4	8·4	
,, 20	0000	15	,,	Bo.	3−3, 4+1	7·9	
,, 20	00	45	,,	Bh.	3−3, 4+1, 6+6	7·9	
,, 20	00	24	,,	Wa.	=5	8·6	
,, 23	03	15	,,	Bo.	=5	8·6	
,, 24	04	45	,,	Br.	=5	8·6	
,, 24	04	,,	,,	Bh.	3−2, 4+2	7·8	
,, 27	07	,,	,,	,,	3−2, 6+7	7·8	
,, 27	07	15	,,	Bo.	4−3, 5+3	8·3	
,, 27	07	30	2	Tn.	3−6·5, 6+3	8·3	
,, 28	0008	20	1	La.	4−4, =5	8·5	

(5194) V BOÖTIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Sept. 2	0013	45	1	Bh.	3−4, 5+5, 6+6	8·0	
„ 4	15	t.22	„	Bl.	3−7, 5+1	8·4	
„ 6	17	T.25	„	Bn.	3−4, 5+4	8·1	
„ 7	18	45	2	Bh.	3−5, 5+4	8·1	
„ 7	18	„	„	Br.	3−6, 5+3	8·2	
„ 8	19	24	1	Bo.	4−3, 5+3	8·3	
„ 8	19	t.22	„	Bl.	3−7, 5+2	8·3	
„ 9	20	30	„	Tn.	3−3, 6+6·5	7·9	
„ 9	20	45	„	Bh.	3−6, 5+3	8·2	
„ 11	22	24	2	Bo.	=4	8·0	
„ 16	27	30	1	Tn.	3−3, 6+6·5	7·9	
„ 19	30	45	„	Bh.	5+1, 6+2	8·4	
„ 20	31	24	„	Bo.	=5	8·6	
„ 20	31	30	„	Tn.	3−2·5, 6+7	7·9	
„ 21	32	45	„	Br.	5+2	8·4	
„ 21	32	24	„	Wa.	3−6, 7+6	8·2	
„ 24	35	„	„	Bo.	4−4, 5+1	8·4	
„ 24	35	40	2	La.	4−3, =5	8·4	
„ 26	37	t.22	1	Bl.	=5	8·6	
„ 27	38	24	„	Bo.	=5	8·6	
„ 27	38	45	2	Bh.	5+2, 6+2	8·4	
„ 27	38	30	„	Tn.	=4	8·0	
„ 28	39	T.25	1	Bn.	3−6, 5+3	8·2	
„ 28	39	24	„	Wa.	=7	8·8	
„ 29	40	30	2	Tn.	3−6·5, 6+3	8·3	
„ 30	41	24	„	Bo.	=5	8·6	
Oct. 1	42	45	„	Bh.	=5, =6	8·6	
„ 3	44	t.22	1	Bl.	=5	8·6	
„ 4	45	24	2	Bo.	=5, 7+1	8·6	
„ 4	45	30	„	Tn.	=6	8·6	
„ 6	47	„	1	„	3−7·5, 6+2	8·4	
„ 9	50	„	2	„	3−7·5, 6+2	8·4	
„ 9	50	45	„	Bh.	5+1, 6+1	8·5	
„ 12	53	24	„	Bo.	=5	8·6	
„ 13	54	45	„	Bh.	5+1, 6+2	8·4	
„ 15	56	30	„	Tn.	3−5, 6+5	8·1	
„ 15	56	24	„	Wa.	4−3, 5+3	8·3	
„ 17	58	45	„	Br.	=5	8·6	
„ 17	58	t.22	1	Bl.	3−7, 5+2	8·3	
„ 20	61	45	2	Bh.	5+3, 6+2	8·3	
„ 22	63	T.25	1	Bn.	3−7·5, 5+2	8·4	
„ 22	63	30	2	Tn.	3−6·5, 6+3	8·3	
„ 23	64	45	1	Bh.	4−2, 5+3, 6+3	8·2	
„ 24	65	24	2	Bo.	=7	8·8	
„ 25	66	t.22	1	Bl.	3−7·5, 6+2	8·4	
„ 25	66	20	„	La.	=5, 11+7	8·5	
„ 25	66	30	„	Tn.	3−6·5, 6+3	8·3	
„ 28	69	45	2	Bh.	5−1, =6	8·6	
„ 28	69	30	„	Tn.	=6	8·6	
„ 31	72	„	„	„	=7	8·8	
„ 31	72	45	„	Br.	5+2	8·4	
„ 31	72	20	1	La.	4−3, =5	8·4	
Nov. 1	73	T.25	„	Bn.	=5, =6	8·6	
„ 3	0075	24	„	Bo.	=7, 8+1	8·8	

(5194) V BOÖTIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Nov. 3	0075	45	I	Bh.	5+2, 6+2	8·4	
,, 4	76	t.22	,,	Bl.	=5	8·6	
,, 6	78	30	,,	Tn.	3−7·5, 6+2	8·4	
,, 11	83	t.22	,,	Bl.	5−1·5, 11+5	8·7	
,, 13	85	30	2	Tn.	=6	8·6	
,, 21	93	90	I	Bh.	9−2, 11+1	9·2	
,, 22	94	45	,,	Br.	11+2	9·0	
,, 22	94	T.25	,,	Bn.	7−0·5, =8	8·8	
,, 22	94	t.22	,,	Bl.	5−4, 11+1	9·0	
,, 26	0098	40	,,	La.	=9, =11	9·1	
,, 28	0100	90	,,	Bh.	11−3, =15, 16+3	9·5	
,, 30	02	40	,,	La.	11−2, 15+2	9·3	
Dec. 9	11	,,	,,	,,	11−5, 15−2, =16, 17−1	9·8	
,, 9	11	90	2	Bh.	11−5, 16+1, 17+2·5	9·7	
,, 12	14	,,	,,	,,	11−6, 16−1, 17+2	9·8	
,, 18	20	T.94	,,	Bl.	11−4, 16+1	9·6	
,, 21	23	40	I	La.	16−5, 17−3, =19	10·3	
,, 23	25	90	,,	Bh.	15−2, 16−1, 17+2	9·8	
,, 24	26	45	2	Br.	17−1	10·1	About. Difficult.
,, 28	30	90	I	Bh.	=17	10·0	
,, 29	31	,,	,,	,,	17−1, =18, 19+2	10·1	
,, 31	33	24	,,	Bo.	20−2, 21+0·5	10·8	
1914.							
Jan. 2	35	40	,,	La.	16−4, 17−4, =19	10·3	
,, 5	38	90	,,	Bh.	19−5, 23+3, 25+5	10·9	
,, 6	39	,,	,,	,,	22−1, =23, 24+1	11·2	
,, 6	39	T.50	,,	Bn.	18−3, 20+0·5	10·5	
,, 14	47	T.94	,,	Bl.	16−5, 21+5	10·3	
,, 21	54	24	2	Bo.	23−1, 25+1	11·3	
,, 23	56	45	,,	Br.	=19	10·4	
,, 23	56	T.94	I	Bl.	16−8, 21+2·5	10·6	
,, 23	56	90	,,	Bh.	=23	11·2	
,, 23	56	40	,,	La.	19−2, 22+3, 23+6	10·6	
,, 24	57	24	,,	Bo.	20−3, 23+3	10·9	
,, 26	59	T.50	,,	Bn.	20−1	10·7	
,, 26	59	90	,,	Bh.	22−1, =23, 24+1	11·2	
Feb. 1	65	24	2	Bo.	20−3, 23+3	10·9	
,, 3	67	,,	I	,,	20−4, 23+1	11·0	
,, 3	67	90	,,	Bh.	20−4, 27+8	11·0	
,, 3	67	40	,,	La.	17−5, =19	10·4	
,, 4	68	T.94	2	Bl.	16−6, 21+4·5	10·4	
,, 10	74	90	,,	Bh.	16−1, 17+1	9·9	
,, 15	79	,,	I	,,	16−1, 17+1	9·9	
,, 17	81	40	,,	La.	16−1, 17+1	9·9	
,, 18	82	45	,,	Br.	17−2, 19+2	10·2	
,, 18	82	T.50	,,	Bn.	17−1, 20+4	10·1	
,, 18	82	90	,,	Bh.	16−2, 19+4	10·0	
,, 21	85	T.94	2	Bl.	11−5, 16+1·5	9·7	Doubtful.
,, 25	89	,,	I	,,	16−1·5, =17	9·9	
,, 26	90	T.50	,,	Bn.	17−1, 18+1	10·1	
,, 26	0190	90	,,	Bh.	16−1, 17+1	9·9	

(5194) V BOÖTIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Mar. 1	0193	45	1	Br.	16−1, 17+1	9·9	
,, 2	94	T.94	2	Bl.	=16	9·8	
,, 7	0199	90	1	Bh.	12−2, 15+1	9·4	
,, 9	0201	40	,,	La.	11−6, 16+2, 17+2	9·7	
,, 16	08	45	,,	Br.	11−4, 16+2	9·6	
,, 17	09	T.94	,,	Bl.	11−2, 16+3·5	9·4	
,, 18	10	45	,,	Bh.	10−3, 11−2, 15+2, 16+4·5	9·3	
,, 22	14	T.50	,,	Bn.	9−1, 13+0·5	9·2	
,, 25	17	90	,,	Bh.	9−1, 11+1	9·1	
,, 27	19	45	,,	Br.	=9	9·1	
,, 27	19	24	,,	Wa.	=11	9·2	
,, 27	19	30	,,	Tn.	=11	9·2	
,, 27	19	t.22	,,	Bl.	=11	9·2	
,, 31	23	T.50	,,	Bn.	=7, 8+1	8·8	
,, 31	23	75	,,	La.	9−2, 11+1	9·2	
Apr. 1	24	45	,,	Bh.	9+2, 11+3	8·9	
,, 1	24	24	,,	Wa.	=11	9·2	
,, 3	26	t.22	,,	Bl.	5−4, 11+3	8·9	
,, 4	27	40	,,	La.	5−2, 9+3	8·8	
,, 10	33	45	,,	Bh.	6−1, 7+1	8·7	
,, 10	33	40	,,	La.	4−5, 5−1, 9+5	8·6	
,, 11	34	30	,,	Tn.	3−7·5, 6+2	8·4	
,, 12	35	24	2	Bo.	=5	8·6	
,, 12	35	t.22	1	Bl.	3−7·5, 6+2	8·4	
,, 14	37	20	,,	La.	4−3, =5	8·4	
,, 14	37	30	,,	Tn.	3−8, 6+1·5	8·4	
,, 15	38	24	,,	Wa.	=11	9·2	
,, 16	39	45	,,	Br.	3−7, 5+2	8·3	
,, 18	41	24	,,	Bo.	=5	8·6	
,, 18	41	45	,,	Bh.	=5, =6	8·6	
,, 18	41	30	,,	Gh.	3−9, =7, 11+6	8·6	
,, 19	42	,,	,,	Tn.	3−2, 4+2	7·8	
,, 20	43	t.22	,,	Bl.	3−6, 5+3	8·2	
,, 21	44	30	,,	Tn.	3−2·5, 4+1	7·9	
,, 21	44	20	,,	La.	4−3, 5+3	8·3	
,, 22	45	45	,,	Bh.	3−5, 5+5	8·1	
,, 24	47	30	,,	Tn.	3−2·5, 4+1	7·9	
,, 24	47	20	,,	La.	4−2, 5+4	8·2	
,, 25	48	24	,,	Bo.	3−8·5, 5+1	8·5	
,, 25	48	30	,,	Gh.	=5	8·6	
,, 26	49	,,	,,	Tn.	3−3, 4+0·5	7·9	
,, 27	50	T.50	,,	Bn.	3−6, 5+3	8·2	
,, 27	50	24	2	Wa.	=6	8·6	Doubtful.
,, 27	50	34	1	Cr.	9+8	8·3	
,, 28	51	t.30	,,	Bn.	3−7, 5+2	8·3	
,, 28	51	F.	,,	Tn.	3−6·5, 6+3	8·3	
,, 28	51	t.22	,,	Bl.	3−1·5, 5+8	7·8	
,, 30	53	45	,,	Bh.	3−3, 4−1, 6+5	8·0	
May 2	55	,,	,,	Br.	3−2	7·8	
,, 2	55	,,	,,	Bh.	3−3, 4+2, 6+6	7·9	
,, 2	55	20	,,	La.	4−4, 5+2	8·4	
,, 2	55	24	,,	Bo.	3−7, 5+2·5	8·3	
,, 2	0255	30	,,	Ln.	4−3, 5+3	8·3	

(5194) V BOÖTIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
May 2	0255	t.22	1	Bl.	3−5, 5+4	8·1	
„ 4	57	30	„	Ln.	4−2, 5+4	8·2	
„ 6	59	20	„	La.	4−1, 5+4	8·1	
„ 8	61	24	2	Bo.	3−5, 5+5	8·1	
„ 8	61	t.22	1	Bl.	3−5, 5+5	8·1	
„ 9	62	45	„	Bh.	=3	7·6	
„ 10	63	30	„	Tn.	3−2, 4+2	7·8	
„ 12	65	20	„	La.	4−3, 5+3	8·3	
„ 12	65	t.22	„	Bl.	3−2, 5+6·5	7·9	
„ 13	66	45	„	Bh.	3−1	7·7	
„ 14	67	30	„	Tn.	3−0·5, 4+3	7·7	
„ 15	68	24	2	Bo.	3−2, 5+6·5	7·9	
„ 15	68	30	1	Ln.	3−1, 4+3	7·7	
„ 15	68	„	„	Gh.	3−5, 5+5	8·1	
„ 16	69	45	„	Br.	3−3	7·9	
„ 16	69	30	„	Gh.	=3	7·6	
„ 16	69	t.22	„	Bl.	3−2, 5+7	7·8	
„ 17	70	t.30	„	Bn.	3+1	7·5	
„ 17	70	30	„	Ln.	=3	7·6	
„ 18	71	45	„	Bh.	3+1	7·5	
„ 20	73	t.22	„	Bl.	3−1·5, 5+8	7·8	
„ 21	74	24	„	Bo.	3−1, 5+8·5	7·7	
„ 21	74	30	„	Ln.	3+1	7·5	
„ 21	74	„	„	Gh.	=3	7·6	
„ 23	76	20	„	La.	4−3, 5+3	8·3	
„ 25	78	T.25	„	Bn.	=3	7·6	
„ 25	78	45	„	Bh.	=3	7·6	
„ 25	78	24	„	Wa.	=3	7·6	
„ 26	79	45	„	Br.	3+2	7·4	
„ 26	79	30	„	Ln.	3+2	7·4	
„ 28	81	24	„	Bo.	3−5, 5+5	8·1	
„ 30	83	t.22	„	Bl.	3+2	7·4	
„ 31	84	45	2	Bh.	3−3, 5+6	7·9	
June 2	86	20	1	La.	3−3, 4+1, 5+5	8·0	
„ 3	87	24	„	Bo.	3−2, 5+6·5	7·9	
„ 3	87	45	2	Bh.	3−5, 5+5	8·1	
„ 5	89	t.22	1	Bl.	P−3, 3+2	7·5	
„ 10	94	45	„	Bh.	3−2, 5+7	7·8	
„ 10	94	30	2	Ln.	3−1, 6+8	7·7	
„ 10	94	24	1	Wa.	=3	7·6	
„ 10	94	t.22	„	Bl.	P−3, 3+2	7·5	
„ 11	95	24	2	Bo.	3−3, 5+6	7·9	
„ 13	97	45	1	Bh.	3+1	7·5	
„ 13	97	20	„	La.	4−2, 5+4	8·2	
„ 14	98	45	„	Br.	3−2	7·8	
„ 15	99	T.50	„	Bn.	3−4, 5+4	8·1	
„ 15	0299	45	„	Bh.	3−2·5, 5+7	7·9	
„ 16	0300	30	„	Ln.	3−1, 6+8	7·7	
„ 17	01	20	„	La.	4−2, 5+4	8·2	
„ 17	01	t.22	2	Bl.	P−4, 3+1	7 6	
„ 18	02	24	„	Bo.	3−3, 5+6	7·9	
„ 19	03	20	1	La.	4−2, 5+4	8·2	
„ 21	05	t.22	„	Bl.	3−3·5, 5+6	8·0	
„ 23	07	20	„	La.	4−3, 5+3	8·3	
„ 24	0308	T.25	„	Bn.	3−7, 5+2	8·3	

(5194) V BOÖTIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
June 24	0308	30	I	Ln.	3−2, 4+2	7·8	
„ 25	09	„	„	Tn.	3−2, 4+2	7·8	
„ 26	10	24	„	Bo.	3−2, 5+7·5	7·8	
„ 26	10	t.22	„	Bl.	3−2, 5+6	7·9	
„ 27	II	45	„	Br.	3−4, 5+6	8·0	
„ 29	13	„	„	Bh.	3−4, 5+6	8·0	
„ 29	13	20	„	La.	4−4, 5+2	8·4	
„ 29	13	30	„	Ln.	3−3, 4+I	7·9	
July 2	16	45	„	Bh.	3−6, 5+4	8·2	
„ 2	16	t.22	„	Bl.	3−8, 5+I·5	8·4	
„ 3	17	20	„	La.	4−4, 5+I	8·4	
„ 3	17	24	„	Wa.	=4	8·0	
„ 3	17	30	„	Tn.	3−2, 4+2	7·8	
„ 4	18	T.25	„	Bn.	3−6, 5+3	8·2	
„ 9	23	15	2	Bo.	3−6, 5+3	8·2	
„ 9	23	30	I	Tn.	3−2·5, 4+I	7·9	
„ 9	23	t.22	2	Bl.	3−8, 5+I·5	8·4	
„ 10	24	30	„	Ln.	3−4, 5+5	8·0	
„ 14	28	45	I	Bh.	=5	8·6	
„ 14	28	20	„	La.	4−4, =5	8·5	
„ 15	29	24	„	Wa.	=5	8·6	
„ 15	29	50	2	Ma.	9+5, II+4	8·7	
„ 17	31	T.50	I	Bn.	3−6, 5+3	8·2	
„ 18	32	45	„	Bh.	5−I, =6	8·6	
„ 19	33	20	„	La.	=5, =6, 7+3	8·5	
„ 21	35	24	„	Wa.	=5	8·6	
„ 23	37	50	„	Ma.	II+3·5	8·8	
„ 24	38	30	2	Ln.	=6	8·6	
„ 25	39	50	I	Ma.	II+4	8·8	
„ 26	40	30	2	Ln.	6−I, 7+I	8·7	
„ 28	42	45	I	Bh.	5−2, 8+I, 9+3	8·8	
„ 28	42	20	„	La.	=5, 6+2, 7+4	8·4	
Aug. 2	47	50	„	Ma.	II+2	9·0	
„ 3	48	45	„	Br.	5−I, 9+4	8·7	
„ 7	52	90	„	Bh.	5−2, 9+2	8·8	
„ 7	52	30	2	Ln.	6−I, 7+I	8·7	
„ 7	52	„	I	Tn.	3−8, 6+I·5	8·4	
„ II	56	20	„	La.	5−3, 6−3, =7, 9+6	8·7	
„ 13	58	30	„	Ln.	=7, =8	8·8	
„ 13	58	24	2	Wa.	=9	9·I	
„ 14	59	T.50	„	Bn.	5−3, 9+2	8·9	
„ 14	59	45	I	Bh.	5−4, I0+I	9·0	
„ 17	62	30	„	Tn.	=6	8·6	
„ 21	66	45	„	Br.	9+I	9·0	
„ 21	66	30	2	Ln.	8−2, II+2	9·0	
„ 23	68	20	I	La.	9+2, II−I	9·I	
„ 23	68	90	„	Bh.	9+5, I0+I·5, II+2	8·8	
„ 26	7I	30	„	Tn.	7−2, II+2	9·0	
„ 26	7I	90	„	Bh.	9−I, II+I	9·I	
„ 28	73	20	„	La.	9+I, =II, I3+3	9·0	
„ 30	75	T.25	„	Bn.	=7, =8	8·8	
Sept. I	77	„	„	„	=8	8·9	
„ I	0377	90	2	Bh.	=II	9·2	

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Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Sept. 4	0380	90	2	Bh.	=11	9·2	
,, 5	81	30	,,	Tn.	7−3, 11+1	9·1	
,, 6	82	T.25	1	Bn.	=7, =8	8·8	
,, 10	86	45	,,	Br.	=11	9·2	
,, 11	87	30	,,	Tn.	=9	9·1	
,, 15	91	90	,,	Bh.	11−3, 16+3	9·5	
,, 17	93	40	,,	La.	11−4, =13, 16+2	9·5	
,, 19	95	T.50	,,	Bn.	=13	9·2	
,, 19	95	30	,,	Tn.	11−1, 16+4	9·3	
,, 20	96	90	,,	Bh.	9−5, 11−4, 16+2·5, 17+4	9·6	
,, 21	97	24	,,	Wa.	=13	9·2	
,, 23	0399	45	,,	Br.	11−3, 16+3	9·5	
,, 25	0401	t.22	,,	Bl.	11−4, 16+1	9·6	
,, 29	05	90	,,	Bh.	15−4, 17−1, 18+2	10·0	
,, 29	05	24	2	Wa.	=18	10·2	
,, 29	05	30	1	Tn.	11−4·5, 16+1	9·7	
Oct. 5	11	,,	2	,,	=16	9·8	
,, 5	11	40	1	La.	16−5, 20+2·5	10·3	
,, 11	17	T.50	,,	Bn.	16−4, 19+2	10·2	
,, 11	17	90	,,	Bh.	18−2, 19−1	10·4	
,, 11	17	T.94	2	Bl.	=16	9·8	
,, 14	20	24	,,	Wa.	=20	10·6	Glimpsed.
,, 16	22	90	1	Bh.	18−5, =21	10·8	
,, 18	24	30	2	Tn.	=17	10·0	
,, 19	25	90	1	Bh.	18−5, 19−1, 20−1	10·6	
,, 20	26	30	,,	Tn.	=16	9·8	
Nov. 3	40	90	,,	Bh.	16−2·5, =17, 20+5	10·0	
,, 7	44	30	,,	Tn.	=16	9·8	
,, 9	46	40	2	La.	=16, 20+6	9·9	
,, 10	47	45	1	Br.	16+1	9·7	
,, 14	51	T.50	,,	Bn.	=16	9·8	
,, 14	51	30	,,	Tn.	16+1	9·7	
,, 15	52	40	,,	La.	13−6, =16, 20+5	9·9	
,, 15	52	90	,,	Bh.	16−1, 17−1, 18+1	10·0	
,, 16	53	t.22	,,	Bl.	=16, 17+2, 21+7	9·9	
,, 18	55	,,	,,	,,	=16	9·8	
,, 19	56	90	,,	Bh.	16−2, 17−2, =18	10·1	
,, 26	63	,,	,,	,,	=15, 16+2	9·5	
,, 28	65	30	2	Tn.	11−4, 16+2	9·6	
Dec. 1	68	90	,,	Bh.	11−2, 15+1	9·4	
,, 3	70	t.22	1	Bl.	11−2, 16+3	9·4	
,, 10	77	45	,,	Bh.	11−2, =12, 15+2	9·3	
,, 15	82	20	,,	La.	9+1, 11−2, 16+4	9·2	
,, 16	83	60	,,	Br.	=9	9·1	
,, 18	85	45	,,	Bh.	11−1, 15+2	9·3	
,, 22	89	t.22	2	Bl.	3−6, 5+2	8·3	Doubtful.
,, 23	90	90	1	Bh.	9+1, 11+3	8·9	
,, 25	92	t.22	,,	Bl.	=5	8·6	
,, 29	0496	45	,,	Bh.	=5, =6	8·6	Orange.

(5237) R BOÖTIS. (V. 1.)

H.D. 143227.

Star A unidentified, 12·26 m. estimated. $\Delta\alpha + 19^s$, $\Delta\delta + 5'{\cdot}5$.
,, X = B.D. + 29° 2555, 7·93 m. estimated.

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910. Jan. 11	8683	t.75	1	Bn.	10−2, 13+2	11·1	
Feb. 4	8707	T.120	2	,,	=18	12·2	
,, 7	10	,,	1	,,	=18, =19	12·2	
,, 11	14	,,	2	,,	=18	12·2	About.
,, 15	18	,,	1	,,	18−1, 19−1	12·3	
Mar. 16	47	,,	,,	,,	16−1, 19+3·5	11·8	
,, 29	60	,,	,,	,,	13−1, 16+3·5	11·4	
Apr. 1	63	,,	,,	,,	10−2, 13+2	11·1	
,, 2	64	T.50	,,	,,	9−2, 10+1	10·8	
May 2	94	,,	,,	,,	2+1	8·3	
,, 4	96	79	2	Ma.	2−1·5	8·6	Doubtful.
,, 7	8799	50	1	,,	2+1	8·3	
,, 12	8804	t.30	,,	Bn.	1−10, 2+5	7·9	
,, 14	06	,,	,,	,,	1−5, 2+10	7·4	
,, 15	07	,,	,,	,,	1−10, 2+5	7·9	
,, 15	07	50	,,	Ma.	1−13, 2+1	8·3	
,, 16	08	,,	2	,,	2+1·5	8·3	
,, 22	14	t.30	1	Bn.	1−4, 2+11·5	7·3	
,, 26	18	,,	,,	,,	1−2·5	7·2	
June 3	26	,,	,,	,,	1−4, 2+11	7·3	
,, 3	26	50	,,	Ma.	2+1·5	8·3	
,, 8	31	t.30	,,	Bn.	1−2·5, 2+13	7·2	
,, 13	36	50	,,	Ma.	1−10, 2+5	7·9	
,, 14	37	t.30	,,	Bn.	1−2	7·1	
,, 15	38	T.25	,,	,,	1−3, 2+12·5	7·2	
,, 17	40	50	,,	Ma.	1−10, 2+5	7·9	
,, 18	41	T.25	,,	Bn.	1−9, 2+6	7·8	
,, 19	42	t.30	,,	,,	1−5, 2+10	7·4	
,, 20	43	T.25	,,	,,	1−9, 2+6	7·8	
,, 22	45	50	,,	Ma.	2+2	8·2	
,, 24	47	,,	,,	,,	2+1	8·3	
,, 26	49	,,	,,	,,	2+1·5	8·3	
,, 28	51	T.25	,,	Bn.	1−13, 2+2·5	8·2	
July 3	56	t.30	,,	,,	2+2	8·2	
,, 4	57	50	2	Ma.	2+2	8·2	
,, 11	64	,,	1	,,	2+1	8·3	
,, 11	64	t.30	,,	Bn.	2+2·5	8·2	
,, 13	66	,,	2	,,	2+2	8·2	
,, 22	75	,,	1	,,	2+1	8·3	
,, 22	75	50	2	Ma.	2−4	8·8	
,, 25	78	T.50	1	Bn.	2−1	8·5	
,, 31	8884	t.60	,,	,,	3−1, 4+3·5	8·9	

(5237) R BOÖTIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Aug. 6	8890	t.60	1	Bn.	4−1, 6+3·5	9·3	
„ 10	94	„	„	„	4−3·5, 6+1	9·6	
„ 12	96	50	„	Ma.	9+2·5	10·3	
„ 15	8899	„	„	„	9+2	10·4	
„ 19	8903	„	„	„	9+1	10·5	
„ 26	10	„	„	„	9+1·5	10·4	
Sept. 3	18	„	„	„	=9	10·6	
„ 3	18	t.75	„	Bn.	7−3, 9+1	10·4	
„ 8	23	„	„	„	10−3, 13+1	11·2	
Oct. 2	47	T.120	2	„	=16	11·7	
Nov. 1	77	T.50	1	„	4−3·5, 6+1	9·6	
„ 9	8985	„	„	„	4−2	9·4	
Dec. 20	9026	„	„	„	2−2·5, 3+1	8·7	
1911.							
Jan. 6	43	t.30	„	„	a−9, 1+1	6·8	
„ 9	46	„	„	„	a−9, 1+1·5	6·7	
„ 31	68	T.25	„	„	1−5, 2+10	7·4	
Feb. 11	79	„	„	„	1−12, 2+3	8·1	
„ 20	88	T.50	„	„	2−2, 3+1	8·7	
„ 25	9093	T.25	„	„	3−1·5	8·9	
Mar. 7	9103	t.60	„	„	4−3, 6+1	9·6	
„ 9	05	T.50	„	„	6−2·5, 7+1	10·0	
Apr. 3	30	T.120	„	„	13−3·5, 16+1	11·6	
„ 16	43	t.120	„	„	16−3, 18+2	12·0	
May 2	59	T.120	„	„	18−2	12·4	
„ 24	81	„	„	„	16−0·5, 18+4	11·8	
„ 24	81	66	„	F.G.B.	16−1, 20+5	11·8	
„ 29	86	T.120	„	Bn.	16−1, 18+3·5	11·8	
June 2	90	„	„	„	13−3·5, 16+1	11·6	
„ 3	91	66	„	F.G.B.	16−1, 20+5	11·8	
„ 7	9195	T.120	„	Bn.	10−2, 13+1	11·1	
„ 17	9205	T.50	„	„	7−3, 9+1	10·4	
„ 27	15	„	„	„	7−1·5, 9+3	10·3	
July 2	20	45	„	F.G.B.	=7	10·1	
„ 5	23	T.50	„	Bn.	4−3, 6+1	9·6	
„ 10	28	„	„	„	4−3·5, 6+1	9·6	
„ 10	28	45	2	F.G.B.	4−7, 7+1	10·0	
„ 21	39	„	1	„	=3	8·8	
„ 22	40	T.50	„	Bn.	3−3, 4+1·5	9·1	
„ 25	43	„	„	„	2−1, 3+1	8·6	
„ 25	43	34	„	Cr.	2+4	8·0	Doubtful. [C.L.B.]
„ 27	45	„	„	„	=2	8·4	
„ 27	45	T.50	„	Bn.	2−1	8·5	
„ 31	9249	t.30	„	„	2+1	8·3	

(5237) R BOÖTIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
Aug. 14	9263	45	2	F.G.B.	=1	6·9	
„ 31	9280	„	„	„	1−5, 2+10	7·4	
Sept. 24	9304	„	1	„	2−6, 4+3	9·0	
„ 26	06	34	„	Cr.	=4	9·2	
„ 26	06	T.50	„	Bn.	2−2·5, 3+1	8·7	
Oct. 1	11	„	„	„	4−1, 6+3	9·4	
„ 4	14	45	2	F.G.B.	4−4, 7+4	9·7	
„ 10	20	T.50	1	Bn.	4−4, 6+0·5	9·6	
„ 26	36	T.120	„	„	13+1	11·2	
„ 31	41	132	2	F.G.B.	=13	11·3	
Nov. 15	56	T.120	„	Bn.	<10	<10·9	Not seen.
Dec. 25	9396	132	1	F.G.B.	16−1, 20+5	11·8	
1912.							
Jan. 9	9411	198	„	„	10−3·5, 13+1	11·2	
„ 26	28	T.120	„	Bn.	10−2, 13+1	11·1	
Mar. 6	68	57	2	Bh.	=X	7·9	
„ 7	69	45	1	F.G.B.	1−10, 2+5	7·9	
„ 7	69	T.50	„	Bn.	1−14, 2+1·5	8·3	
„ 11	73	20	„	La.	1−6, 2+9	7·5	
„ 12	74	„	2	„	1−6, 2+9	7·5	
„ 13	75	„	„	„	1−7, 2+7	7·7	
„ 15	77	„	„	„	1−9, 2+6	7·8	
„ 15	77	57	1	Bh.	1−7, 2+7	7·7	
„ 18	80	„	„	„	=d	7·4	
„ 19	81	„	„	„	=d	7·4	
„ 19	81	20	2	La.	1−7, 2+7	7·7	
„ 23	85	57	1	Bh.	1−7, 2+7	7·7	
„ 26	88	20	„	La.	1−10, 2+5	7·9	
„ 28	90	57	2	Bh.	1−4, 2+12	7·3	
„ 29	91	40	„	La.	1−10, 2+5	7·9	
„ 31	93	57	„	Bh.	1−5, =d, 2+10	7·4	
Apr. 1	94	T.25	1	Bn.	1−11, 2+4	8·0	
„ 3	96	T.50	„	„	1−12, 2+3	8·1	
„ 6	99	45	2	Bh.	1−4, d+1	7·3	Dull.
„ 6	9499	20	„	La.	1−10·5, 2+4	8·0	
„ 9	9502	45	1	Bh.	1−3, d+3	7·2	
„ 10	03	20	„	La.	1−12·5, 2+2	8·2	
„ 12	05	„	„	„	1−12·5, 2+2	8·2	
„ 16	09	45	2	Bh.	1−7, =X, 2+7	7·8	
„ 19	12	„	1	F.G.B.	1−12, 2+2	8·2	
„ 20	13	„	„	Bh.	1−12, 2+4	8·1	
„ 22	15	„	„	„	2−2, 3+2	8·6	Reddish.
„ 22	15	„	„	F.G.B.	=2	8·4	
„ 24	17	20	„	La.	=2	8·4	
„ 25	18	38	2	Gd.	3+2	8·6	
„ 27	20	45	1	F.G.B.	2−3, 4+6	8·7	
„ 29	9522	T.50	„	Bn.	2−1·5, 3+2	8·6	

(5237) R BOÖTIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
May 8	9531	T.50	1	Bn.	4−2, 6+2	9·5	
,, 10	33	40	,,	La.	=4	9·2	
,, 12	35	45	2	Bh.	=5	9·3	
,, 14	37	,,	,,	,,	6−2, 8+6	9·9	
,, 16	39	,,	1	F.G.B.	4−1·5, 7+7	9·4	
,, 20	43	,,	,,	,,	4−7, 7+1	10·0	
,, 20	43	,,	,,	Bh.	8−1, =9, 10+2	10·6	
,, 23	46	,,	,,	,,	8−2, 10+2	10·7	
,, 24	47	,,	,,	F.G.B.	7−1, 9+4·5	10·2	
,, 24	47	T.50	,,	Bn.	6−3, 7+1	10·0	
,, 31	54	90	,,	Bh.	8−3, 9−1, 10+1, 12+3	10·8	
June 2	56	T.50	,,	Bn.	7−3·5, 9+1	10·5	
,, 5	59	40	2	La.	=12	11·1	
,, 6	60	45	1	F.G.B.	9−1·5, 13+6	10·7	
,, 6	60	90	2	Bh.	=9, =10, =11	10·8	
,, 6	60	T.50	1	Bn.	9−2, 10+1	10·8	
,, 14	68	90	2	Bh.	12−3, 16+3	11·4	
,, 19	73	,,	1	,,	=16	11·7	
,, 19	73	40	2	La.	13−2, 16+1	11·6	
,, 20	74	T.120	1	Bn.	13−2, 16+2	11·5	
,, 29	83	90	2	Bh.	=18, =19	12·2	
July 5	89	,,	,,	,,	=18, =19	12·2	
,, 5	89	T.120	1	Bn.	16−1·5, 18+3	11·9	
,, 8	92	,,	,,	,,	16−2, 18+2·5	11·9	
,, 8	92	90	2	Bh.	=19, =20	12·2	
,, 10	94	T.94	,,	Bl.	16−1·5, 18+3	11·9	
,, 11	95	90	1	Bh.	=19, =20	12·2	
,, 11	95	T.120	,,	Bn.	16−3·5, 19+1	12·1	
,, 15	99	T.94	2	Bl.	16−2, 18+2	12·0	
,, 15	9599	90	,,	Bh.	=20	12·3	
,, 25	9609	,,	,,	,,	20−1	12·4	
,, 30	14	T.94	,,	Bl.	16−3, 18+1·5	12·0	
Aug. 1	16	,,	,,	,,	16−4, 18+0·5	12·1	
,, 12	27	90	,,	Bh.	<18	<12·2	Not seen.
,, 20	35	,,	,,	,,	13−4, =16, 19+4	11·7	
,, 20	35	T.94	,,	Bl.	=10	10·9	
,, 27	42	90	,,	Bh.	=13, =14	11·3	
,, 29	44	,,	,,	,,	=13	11·3	
Sept. 2	48	T.50	1	Bn.	6−3·5, 7+1	10·0	
,, 2	48	90	2	Bh.	=10, =11	10·9	
,, 4	50	T.94	,,	Bl.	7−2, 10+6	10·3	
,, 5	51	40	1	La.	6−3, 7+1	10·0	
,, 6	52	45	2	Bh.	8−1, =9, 10+3	10·6	
,, 13	59	T.94	1	Bl.	=4	9·2	
,, 15	61	20	,,	La.	3−3, 4+1	9·1	
,, 18	64	T.50	,,	Bn.	3−3·5, 4+1	9·1	
,, 20	66	45	,,	Bh.	3−2, 4+2	9·0	
,, 21	67	T.94	,,	Bl.	2−4, 4+3	8·9	
,, 22	68	T.50	,,	Bn.	2−2·5, 3+1	8·7	
,, 22	68	45	2	Bh.	2−4, =3, 4+4, 5+4	8·9	
,, 24	9670	,,	1	,,	=3	8·8	

(5237) R BOÖTIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Sept. 26	9672	T.94	1	Bl.	2−1, 4+6	8·6	
,, 30	76	45	,,	Bh.	=2, 3+5	8·4	
Oct. 2	78	,,	,,	,,	2+5	7·9	
,, 2	78	t.22	,,	Bl.	1−14, 2+1·5	8·3	
,, 2	78	T.50	,,	Bn.	2−1, 3+2·5	8·5	
,, 4	80	45	2	Bh.	1−12, 2+4	8·1	
,, 6	82	t.30	1	Bn.	1−14, 2+1·5	8·3	
,, 7	83	t.22	,,	Bl.	1−12, 2+3	8·1	
,, 7	83	45	,,	Bh.	2+5	7·9	
,, 9	85	t.22	,,	Bl.	1−13, 2+3	8·2	
,, 10	86	t.30	,,	Bn.	1−10, 2+5	7·9	
,, 11	87	45	2	Bh.	1−7, 2+7	7·7	
,, 11	87	20	,,	La.	e+1, 2+5	7·9	
,, 14	90	40	1	,,	e+2	7·7	
,, 15	91	t.22	,,	Bl.	1−10, 2+6	7·9	
,, 17	93	t.30	,,	Bn.	=1	6·9	
,, 17	93	45	2	Bh.	1−2, 2+10	7·3	
,, 17	93	20	,,	La.	1−7, 2+7	7·7	
,, 19	95	,,	1	,,	1−6, 2+9	7·5	
,, 19	95	45	2	Bh.	1−1	7·0	
,, 22	9698	,,	,,	,,	1−1	7·0	
,, 25	9701	,,	,,	,,	1−1	7·0	
,, 28	04	20	1	La.	1+1	6·8	
,, 29	05	45	,,	Bh.	1−1	7·0	
,, 30	06	,,	2	,,	1−2	7·1	
Nov. 1	08	T.50	,,	Bn.	1+2	6·7	
,, 1	08	20	1	La.	=1	6·9	
,, 3	10	t.22	,,	Bl.	a−3, 1+8	6·1	Doubtful. [C.L.B.]
,, 3	10	45	2	Bh.	1+3	6·6	
,, 5	12	,,	,,	,,	1+2	6·7	
,, 7	14	,,	,,	,,	1+2	6·7	
,, 7	14	20	1	La.	1−1	7·0	
,, 11	18	45	2	Bh.	1+1	6·8	
,, 13	20	20	1	La.	=1	6·9	
,, 13	20	t.30	,,	Bn.	1+2·5	6·7	
,, 17	24	45	,,	Bh.	1−1	7·0	
,, 20	27	,,	2	,,	1−3	7·2	
,, 25	32	20	,,	La.	1−6, 2+9	7·5	
,, 29	36	45	,,	Bh.	1−7, 2+7	7·7	
Dec. 3	40	20	,,	La.	2+2	8·2	
,, 4	41	t.22	,,	Bl.	1−14, 2+2	8·3	
,, 5	42	45	1	Bh.	1−12, 2+4	8·1	
,, 5	42	20	2	La.	2+1	8·3	
,, 7	44	,,	1	,,	=2	8·4	
,, 8	45	45	2	Bh.	=2	8·4	
,, 11	48	,,	1	,,	2−1, 3+3	8·5	
,, 11	48	20	2	La.	2−2, 3+2	8·6	
,, 16	53	45	1	Bh.	2−4, =3, 4+4	8·8	
,, 21	58	,,	2	,,	3−2, 4+2	9·0	
,, 23	60	,,	,,	,,	=4, =5	9·3	
,, 27	64	,,	1	,,	4−2, =5, 6+2	9·4	Dull red.
,, 29	66	T.50	,,	Bn.	4−2, 6+2	9·5	
,, 31	9768	45	2	Bh.	3−7, =6, 7+7	9·5	

(5237) R BOÖTIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Jan. 2	9770	45	2	Bh.	6−6, 7−2, 9+2, 10+6	10·3	
" 3	71	T.94	1	Bl.	4−4, 7+4	9·7	
" 5	73	45	"	Bh.	7−3, =8, 9+1·5	10·4	
" 8	76	"	2	"	8−2, =9, 10+2	10·6	
" 11	79	"	1	"	=10	10·9	
" 12	80	40	2	La.	=10	10·9	
" 17	85	90	"	Bh.	=10, =11, =12	11·0	
" 26	94	45	"	"	12−3, 16+3	11·4	
" 26	94	T.94	1	Bl.	13−1, 16+4	11·4	
" 31	9799	90	"	Bh.	13−4, 19+4	11·7	
Feb. 4	9803	"	"	"	13−4, =16, 19+4	11·7	
" 8	07	T.94	"	Bl.	16−2·5, 20+3	12·0	
" 9	08	40	2	Gi.	16−1, 20+1	12·0	
" 10	09	90	"	Bh.	13−6, 16−2, 18+3, 19+2	11·9	
" 12	11	"	1	"	=18, =19	12·2	
" 13	12	40	"	La.	10−1, 13+2	11·0	Doubtful. [C.L.B.]
" 24	23	T.94	"	Bl.	=16	11·7	
" 27	26	90	"	Bh.	18−2, 20+1	12·3	
Mar. 3	30	40	2	Gi.	=t	12·6	
" 3	30	90	1	Bh.	19−4, 20−2	12·5	
" 5	32	T.94	"	Bl.	18−2, 20−2	12·4	
" 10	37	"	"	"	20−2	12·5	
" 11	38	90	"	Bh.	=18, =19	12·2	
" 17	44	"	2	"	16−2, 17−1, 18+2, 19+1	12·0	
" 20	47	"	1	"	16−3, 18+2	12·0	
" 25	52	t.22	"	Bl.	16−1, 20+4	11·8	
" 27	54	90	"	Bh.	16−2, =17, 18+2	11·9	
" 30	57	"	"	"	13−5, 20+5	11·8	
" 30	57	T.120	"	Bn.	16−2, 19+2	12·0	
Apr. 1	59	79	"	Ma.	16−1	11·8	
" 1	59	T.94	"	Bl.	13−3·5, 16+1	11·6	
" 1	59	90	"	Bh.	12−5, 13−3, 16+1	11·6	
" 4	62	"	"	"	12−4, 13−3, 16+1	11·6	
" 6	64	40	2	La.	=16	11·7	
" 7	65	45	"	Bh.	=13, =14	11·3	
" 7	65	T.94	1	Bl.	=10	10·9	
" 11	69	45	2	Bh.	=10, =11, =12	11·0	
" 13	71	T.94	1	Bl.	7−4, 10+4	10·5	
" 16	74	45	2	Bh.	=8, =9, =10	10·6	
" 19	77	T.94	1	Bl.	4−6·5, 7+2	9·9	
" 20	78	45	"	Bh.	=8, =9	10·5	
" 22	80	79	2	Ma.	9+1·5	10·4	
" 23	81	45	1	Bh.	7−4, =8, 10+4	10·5	
" 24	82	T.94	"	Bl.	4−4, 7+4	9·7	
" 26	84	"	"	"	4−4, 7+4·5	9·6	
" 27	85	45	"	Bh.	4−3, 6+1, 7+6	9·5	
" 28	86	20	"	La.	4−1, 6+4	9·3	
May 1	89	T.50	"	Bn.	4−3·5, 6+1	9·6	
" 1	89	20	"	La.	4−1, 6+3	9·4	
" 1	9889	50	"	Ma.	9+3	10·3	

(5237) R BOÖTIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
May 2	9890	50	1	Ma.	4−4, 9+8	9·7	
„ 2	90	45	2	Bh.	5−2·5, 6+2, 7+5	9·6	
„ 3	91	T.94	1	Bl.	2−6·5, 4+2	9·1	
„ 4	92	45	„	Bh.	3−6, 6+3	9·4	
„ 5	93	40	„	La.	4−1·5, 6+3	9·4	
„ 9	97	50	„	Ma.	4−1, 7+8	9·3	
„ 9	97	40	„	La.	=4	9·2	
„ 10	98	T.50	„	Bn.	3−4, 4+1	9·2	
„ 11	9899	45	„	Bh.	4−4, =6, 7+4	9·7	
„ 12	9900	40	„	Gi.	=3	8·8	
„ 13	01	T.50	„	Bn.	3−2, 4+2	9·0	
„ 14	02	t.22	„	Bl.	=4	9·2	
„ 16	04	T.50	„	Bn.	3−1, 4+2	9·0	
„ 16	04	45	2	Bh.	3−3, 4+1	9·1	
„ 16	04	50	„	Ma.	4−1	9·3	
„ 18	06	40	1	Gi.	2−3, 3+2	8·7	
„ 18	06	„	„	La.	=3	8·8	
„ 21	09	20	„	„	2−1, 3+2	8·6	
„ 21	09	45	2	Bh.	=2, 3+3	8·5	
„ 23	11	20	1	La.	=2	8·4	
„ 23	11	50	„	Ma.	2−1·5	8·6	
„ 24	12	T.50	„	Bn.	1−12, 2+3	8·1	
„ 24	12	t.22	„	Bl.	=2	8·4	
„ 25	13	45	„	Bh.	2+2, 3+5	8·3	
„ 25	13	40	„	Gi.	e−2, f+1	8·1	
„ 25	13	t.22	„	Bl.	1−14, 2+2	8·3	
„ 26	14	24	„	Bo.	1−12, 2+3	8·1	
„ 26	14	20	„	La.	=f, 2+2	8·2	
„ 28	16	24	„	Bo.	1−12, 2+4	8·1	
„ 28	16	20	„	La.	e−1, f+2, 2+4	8·0	
„ 30	18	45	„	Bh.	2+3, 3+7	8·1	
„ 31	19	T.25	„	Bn.	1−10, 2+5	7·9	
„ 31	19	t.22	„	Bl.	1−12, 2+3·5	8·1	
„ 31	19	50	„	Ma.	2+2	8·2	
June 1	20	40	„	Gi.	e+3	7·6	
„ 1	20	20	„	La.	=e	7·9	
„ 2	21	24	„	Bo.	1−10, 2+5	7·9	
„ 3	22	T.50	„	Bn.	1−3, 2+12·5	7·2	
„ 3	22	t.22	„	Bl.	1−9, 2+7	7·8	
„ 4	23	45	2	Bh.	1−6, 2+6	7·7	
„ 6	25	T.25	1	Bn.	1−4, 2+11·5	7·3	
„ 7	26	45	„	Bh.	1−5, 2+10	7·4	
„ 7	26	50	„	Ma.	2+2	8·2	
„ 8	27	20	2	La.	e+2, 2+5	7·8	
„ 9	28	B.	1	Gi.	1−3, =d	7·3	
„ 10	29	50	„	Ma.	2+2·5	8·2	
„ 11	30	45	2	Bh.	1−6, 2+9	7·5	
„ 12	31	20	1	La.	=e, 2+5	7·9	
„ 12	31	t.22	„	Bl.	1−5, 2+10	7·4	
„ 14	33	24	„	Bo.	1−7, 2+7	7·7	
„ 14	33	45	„	Bh.	1−6, 2+9	7·5	
„ 15	34	20	2	La.	1−9, 2+6	7·8	
„ 15	34	t.22	1	Bl.	1−4, 2+12	7·3	
„ 16	35	T.25	„	Bn.	1−4, 2+11·5	7·3	
„ 17	9936	45	„	Bh.	1−6, 2+9	7·5	

(5237) R BOÖTIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
June 19	9938	24	1	Bo.	1−7, 2+7	7·7	
,, 20	39	T.25	,,	Bn.	1−10, 2+5	7·9	
,, 21	40	45	2	Bh.	1−7, 2+7	7·7	
,, 22	41	t.22	1	Bl.	1−12, 2+4	8·1	
,, 23	42	20	,,	La.	e−1, 2+4	8·0	
,, 25	44	24	2	Bo.	1−12, 2+4	8·1	
,, 25	44	t.22	1	Bl.	1−14, 2+2	8·3	
,, 27	46	T.25	,,	Bn.	1−13, 2+2	8·2	
,, 27	46	45	,,	Bh.	1−12, 2+4	8·1	
,, 27	46	24	,,	Bo.	1−12, 2+3	8·1	
,, 30	49	,,	,,	,,	1−12, 2+3	8·1	
,, 30	49	45	,,	Bh.	=2	8·4	
July 3	52	T.25	,,	Bn.	1−14, 2+1	8·3	
,, 7	56	90	2	Bh.	1−12, 2+4	8·1	
,, 7	56	t.22	1	Bl.	=2	8·4	
,, 8	57	,,	,,	,,	2−1, 4+6	8·6	
,, 11	60	T.50	,,	Bn.	2−1, 3+2·5	8·5	
,, 11	60	45	,,	Bh.	2−2, 3+2	8·6	
,, 11	60	50	,,	Ma.	2−0·5	8·5	
,, 19	68	45	,,	Bh.	2−2, 3+1	8·7	
,, 20	69	T.50	,,	Bn.	3−3, 4+1·5	9·1	
,, 23	72	t.22	,,	Bl.	2−6, 4+1	9·1	
,, 24	73	15	2	Bo.	3−2, 4+2	9·0	
,, 25	74	45	1	Bh.	3−2, 5+3	9·0	
,, 26	75	40	2	La.	=4	9·2	
,, 28	77	15	1	Bo.	=4	9·2	
,, 28	77	T.50	,,	Bn.	4−1, 6+3	9·4	
,, 30	79	45	2	Bh.	4−1	9·3	
,, 30	79	t.22	1	Bl.	4−3, 7+6	9·5	
Aug. 2	82	24	,,	Bo.	=6	9·7	
,, 2	82	45	,,	Bh.	3−6, 4−1, 7+6	9·4	
,, 5	85	79	2	Ma.	9+2	10·4	
,, 6	86	45	1	Bh.	6−4, 8+4	10·1	
,, 6	86	T.94	,,	Bl.	4−6, 7+2	9·9	
,, 9	89	45	,,	Bh.	8−3, =9, 10+1·5	10·7	
,, 15	95	T.94	,,	Bl.	7−5, 10+2·5	10·6	
,, 16	9996	90	,,	Bh.	8−2, =9, 10+2	10·6	
,, 24	0004	,,	,,	,,	11−2, =13, 14+2	11·2	
,, 27	07	150	,,	,,	13−3, 16−1	11·7	
,, 30	10	T.94	,,	Bl.	16−4, 18+1	12·1	
Sept. 2	13	150	2	Bh.	13−5, 16−3	11·9	
,, 3	14	183	1	Ma.	13−5, 16−3, =18	12·0	
,, 6	17	T.120	2	Bn.	=18	12·2	About.
,, 7	18	T.150	1	,,	18−1, 19−1, 20+2	12·2	
,, 8	19	T.94	,,	Bl.	=20	12·3	
,, 9	20	150	,,	Bh.	19+2	12·0	
,, 20	31	90	2	,,	=18, =20	12·2	
,, 24	35	150	1	,,	18−1, =20	12·3	
,, 27	38	90	2	,,	18−1, 20−1	12·3	
,, 27	38	T.94	,,	Bl.	20−5	12·8	Doubtful.
,, 29	40	90	1	Bh.	18−3, 20−2	12·5	
Oct. 9	0050	,,	,,	,,	18−3, 20−3	12·5	

(5237) R BOÖTIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Oct. 17	0058	350	1	Bh.	18−3, 20−1	12·4	
„ 23	64	90	3	„	16−5, 18+1	12·2	
„ 25	66	T.94	1	Bl.	16−4, 18+1	12·1	
„ 29	70	„	„	„	16−3, 18+1·5	12·0	
„ 30	71	90	„	Bh.	16−3, 18+2	12·0	
Nov. 3	75	„	2	„	16−1·5, 18+3	11·9	
„ 8	80	„	1	„	13−3, 16+1	11·6	
„ 21	93	„	„	„	8−4, =10, 13+4	10·9	
„ 24	96	„	„	„	4−3, =5, 7+6	9·5	
„ 26	0098	40	2	La.	6−4, 8+4	10·1	
„ 28	0100	45	„	Bh.	3−3, 4+2, 5+2	9·1	
„ 30	02	40	1	La.	=6, 7+4	9·7	
Dec. 8	10	„	2	„	3−5, 4−1	9·3	
„ 9	11	90	„	Bh.	3−2, 4+2	9·0	
„ 10	12	20	1	La.	3−5, 4+1	9·2	
„ 12	14	90	„	Bh.	2−2, =3, 4+6	8·7	
„ 16	18	„	„	„	=2	8·4	
„ 18	20	t.22	„	Bl.	=2	8·4	
„ 21	23	40	„	La.	2−1, 3+3	8·5	
„ 23	25	45	„	Bh.	1−10, 2+5	7·9	
„ 29	31	„	„	„	1−6, 2+9	7·5	
„ 31	33	„	„	„	1−4, 2+12	7·3	
1914.							
Jan. 2	35	20	„	La.	1−4, e+6	7·3	
„ 5	38	45	„	Bh.	1−5, 2+10	7·4	
„ 6	39	T.25	„	Bn.	a−10, 1+1	6·8	
„ 14	47	t.22	„	Bl.	a−10, 1+2	6·8	
„ 18	51	45	2	Bh.	1−5, 2+10	7·4	
„ 20	53	t.22	„	Bl.	a−10, 1+2	6·8	
„ 21	54	24	„	Bo.	1−3, 2+12	7·2	
„ 23	56	90	1	Bh.	1−3, 2+12	7·2	
„ 23	56	20	„	La.	=1	6·9	
„ 23	56	t.22	„	Bl.	=1	6·9	
„ 25	58	45	„	Bh.	1−6, 2+9	7·5	
„ 26	59	T.50	„	Bn.	1−5, 2+10	7·4	
Feb. 1	65	24	„	Bo.	1−7, 2+7	7·7	
„ 3	67	„	„	„	1−7, 2+7	7·7	
„ 3	67	45	„	Bh.	1−9, 2+6	7·8	
„ 3	67	20	„	La.	1−4, e+3	7·4	
„ 4	68	t.22	2	Bl.	1−4, 2+12	7·3	
„ 5	69	20	„	La.	1−3, e+6	7·2	
„ 10	74	t.22	1	Bl.	1−3·5, 2+12	7·2	Feb. 12. By Phot. 7·7.
„ 15	79	45	2	Bh.	2+2	8·2	
„ 17	81	20	1	La.	1−10, =e, 2+4	7·9	
„ 18	82	T.50	„	Bn.	2+2	8·2	
„ 22	86	45	2	Bh.	2+3, 3+5	8·2	
„ 25	89	t.22	„	Bl.	1−12, 2+2	8·2	
„ 26	90	T.50	1	Bn.	2−1, 3+2	8·6	
„ 26	0190	90	„	Bh.	=3	8·8	

(5237) R BOÖTIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Mar. 2	0194	t.22	2	Bl.	2−5, 4+2	9·0	
„ 6	98	T.50	1	Bn.	3−1, 4+3·5	8·9	
„ 7	0199	90	„	Bh.	3−4, 4−2, 6+6, 7+6	9·3	
„ 9	0201	75	3	La.	2−2, 3+2	8·6	
„ 16	08	90	1	Bh.	4−3, =5, 7+6	9·5	
„ 18	10	60	„	Ga.	=6	9·7	
„ 21	13	„	„	„	=7, =8, 9+3	10·3	
„ 21	13	T.50	„	Bn.	4−2·5, 6+2	9·5	
„ 22	14	90	„	Bh.	6−4, 8+4	10·1	
„ 25	17	„	„	„	=8, =9	10·5	
„ 27	19	60	2	Ga.	=9	10·6	
„ 28	20	T.94	1	Bl.	4−7, 7+1	10·0	
„ 29	21	90	„	Bh.	8−2, 9−3, 10+2, 12+3	10·8	
„ 31	23	T.95	„	Bn.	9−2, =10	10·8	
„ 31	23	79	„	Ma.	=9, 10+1, 13+2	10·8	
Apr. 3	26	T.94	„	Bl.	7−6, 10+3	10·6	
„ 5	28	45	„	Bh.	=12, 13+2	11·1	
„ 5	28	40	2	La.	8−2, 10+2, 13+5	10·7	
„ 5	28	„	1	Bc.	8+1	10·4	
„ 10	33	90	„	Bh.	12−3, 16+3	11·4	
„ 12	35	79	„	Ma.	=16	11·7	
„ 12	35	T.94	„	Bl.	13−2·5, 16+2	11·5	
„ 14	37	40	„	La.	13−3, 16+1	11·6	
„ 15	38	90	„	Bh.	13−3, 16+1	11·6	
„ 15	38	79	„	Ma.	13−2, 16+2	11·5	
„ 17	40	„	„	„	16−1	11·8	
„ 19	42	90	„	Bh.	16−3, 20+3	12·0	
„ 20	43	79	„	Ma.	=16	11·7	
„ 20	43	T.94	2	Bl.	16−0·5, 18+4	11·8	
„ 22	45	40	„	La.	16−3, =18, 20+3	12·1	
„ 23	46	183	1	Ma.	16−2	11·9	
„ 26	49	150	„	Bh.	=20	12·3	
„ 27	50	T.120	„	Bn.	16−4, 18+0·5, 19+1	12·1	
„ 28	51	40	„	La.	16−5, =20	12·2	
„ 28	51	T.94	„	Bl.	16−1, A+5	11·8	
„ 30	53	90	„	Bh.	20−2	12·5	
May 2	55	150	„	„	20−3	12·6	
„ 2	55	T.94	„	Bl.	16−2, A+3·5	11·9	
„ 8	61	„	„	„	16−4, A+1·5	12·1	
„ 10	63	150	„	Bh.	20−4	12·7	
„ 12	65	T.94	„	Bl.	=A	12·3	
„ 13	66	150	„	Bh.	20−3	12·6	
„ 14	67	40	2	La.	16−5, =20	12·2	
„ 16	69	T.94	1	Bl.	16−3·5, A+2	12·1	
„ 17	70	T.120	„	Bn.	18−2, 19−2	12·4	
„ 18	71	150	„	Bh.	=20	12·3	
„ 20	73	T.94	„	Bl.	16−3·5, A+2	12·1	
„ 24	77	40	3	La.	18−4	12·6	
„ 25	78	T.120	1	Bn.	=18, =19	12·2	
„ 25	78	90	„	Bh.	16−4, 20+2	12·1	
„ 30	83	T.94	„	Bl.	16−1, A+4	11·8	
„ 31	0284	90	2	Bh.	16−2, 20+4	11·9	

(5237) R BOÖTIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
June 3	0287	90	1	Bh.	=16	11·7	
,, 5	89	T.94	,,	Bl.	13−3·5, 16+1	11·6	
,, 10	94	,,	,,	,,	=16	11·7	
,, 10	94	90	,,	Bh.	=16	11·7	
,, 11	95	40	,,	La.	13−3, 16−1	11·7	
,, 12	96	T.94	,,	Bl.	=16	11·7	
,, 13	97	150	,,	Bh.	13−2, 16+2	11·5	
,, 14	98	160	,,	Br.	13−3, 16+1·5	11·6	
,, 14	0298	T.95	,,	Bn.	10−3, 13+1	11·2	
,, 16	0300	40	,,	La.	13−2, 16+3	11·5	
,, 17	01	T.94	,,	Bl.	=10	10·9	
,, 19	03	45	,,	Bh.	12−2, =13, 16+4	11·3	
,, 19	03	40	,,	La.	13+2	11·1	
,, 21	05	T.94	,,	Bl.	10−2, 13+1	11·1	
,, 23	07	40	2	La.	10−3, 13+2	11·1	
,, 24	08	T.95	1	Bn.	10−2, 13+1	11·1	
,, 25	09	90	,,	Bh.	=12, 13+2	11·1	
,, 26	10	70	2	Bo.	10−1, 12+1	11·0	
,, 26	10	T.94	1	Bl.	7−4, 10+4	10·5	
,, 28	12	79	,,	Ma.	9−1, 10+1	10·7	
,, 29	13	90	,,	Bh.	=9	10·6	
,, 30	14	T.95	,,	Bn.	10−3, 13+1	11·2	
July 2	16	T.94	,,	Bl.	7−2·5, 10+5	10·4	
,, 3	17	40	3	La.	8−2, =10	10·8	
,, 8	22	45	2	Bh.	6−4, =7, 8+4	10·1	
,, 8	22	40	1	La.	7−3, 8+1	10·4	
,, 9	23	T.94	2	Bl.	4−6, 7+2·5	9·8	
,, 9	23	79	1	Ma.	9+1·5	10·4	
,, 11	25	40	,,	Bc.	8+1	10·4	
,, 14	28	T.50	,,	Bn.	7−1, 9+3·5	10·2	
,, 14	28	90	,,	Bh.	4−6, =6, 7+3	9·8	
,, 15	29	79	,,	Ma.	9+2	10·4	
,, 18	32	90	,,	Bh.	4−3, 7+6	9·5	
,, 19	33	40	,,	La.	4−5, 6+1	9·7	
,, 20	34	,,	,,	Bc.	6−3, 7+1	10·0	
,, 23	37	20	,,	La.	=3, k+1, 2−4, 4+4	8·9	
,, 28	42	45	,,	Bh.	2−4, =3, 4+4	8·8	
,, 30	44	,,	2	,,	2−2, 3+1	8·7	
Aug. 2	47	60	,,	Ga.	3−3, 4+3	9·0	
,, 3	48	,,	,,	,,	2−2, 3+1, 4+4	8·7	
,, 5	50	45	1	Bh.	2+3, 3+6	8·2	
,, 11	56	60	2	Ga.	=2, 4+10	8·3	
,, 12	57	45	1	Bh.	1−12, 2+4	8·1	
,, 13	58	60	,,	Ga.	=2	8·4	
,, 14	59	,,	,,	,,	2+2	8·2	
,, 14	59	45	,,	Bh.	1−10, 2+5	7·9	
,, 14	59	T.50	,,	Bn.	1−10, 2+5	7·9	
,, 21	66	45	,,	Bh.	1−6, 2+9	7·5	
,, 23	68	20	,,	La.	=e, 2+5	7·9	
,, 26	71	T.50	,,	Bn.	1−9, 2+6·5	7·8	
,, 26	71	45	2	Bh.	1−6, 2+9	7·5	
,, 28	73	,,	1	,,	1−5, 2+10	7·4	
,, 28	0373	20	,,	La.	1−7, e+3	7·6	

(5237) R BOÖTIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Aug. 30	0375	T.25	I	Bn.	I−IO, 2+5	7·9	
,, 31	76	60	,,	Ga.	I−5, 2+6	7·6	
Sept. I	77	T.25	,,	Bn.	I−8, 2+8	7·7	
,, I	77	45	,,	Bh.	I−6, 2+9	7·5	
,, I	77	40	,,	La.	e+2, 2+6	7·8	
,, 2	78	,,	,,	Bc.	e+4	7·5	
,, 4	80	45	,,	Bh.	I−9, 2+6	7·8	
,, 6	82	T.25	,,	Bn.	I−8, 2+8	7·7	
,, 9	85	40	,,	Bc.	I−5, =d	7·4	
,, IO	86	T.50	,,	Bn.	I−9, 2+6·5	7·8	
,, IO	86	45	,,	Bh.	I−I2, 2+5	8·0	
,, I5	9I	,,	,,	,,	2+2	8·2	
,, I6	92	40	,,	Bc.	d−3, f+4	7·8	
,, I7	93	20	,,	La.	e−2, 2+3	8·I	
,, I8	94	60	,,	Ga.	2+2	8·2	
,, I9	95	T.50	,,	Bn.	I−I2, 2+3	8·I	
,, 23	0399	60	,,	Ga.	=2, 3+4	8·4	
,, 24	0400	45	,,	Bh.	=2	8·4	
,, 27	03	T.94	2	Bl.	I−I2, 2+3	8·I	
,, 27	03	40	I	Bc.	f+2, 2+4	8·0	
,, 29	05	90	,,	Bh.	2−2, 3+3	8·6	
Oct. 4	IO	45	,,	,,	2−2, 3+2	8·6	
,, 4	IO	T.50	,,	Bn.	2−2·5, 3+I	8·7	
,, 5	II	40	,,	La.	2−5, =3	8·9	
,, II	I7	T.50	,,	Bn.	3−4, 4+I	9·2	
,, I9	25	90	,,	Bh.	3−5	9·3	
,, 27	33	45	,,	,,	6−2, 7+2	9·9	
Nov. 3	40	90	2	,,	9−3, 8−2, IO+I, I2+3	IO·8	
,, I4	5I	,,	I	,,	I3−3, I6+2	II·6	
,, I5	52	,,	,,	,,	I3−5, =I6, 20+5	II·8	
,, I6	53	T.94	2	Bl.	IO−2, I3+2	II·I	
,, I9	56	90	I	Bh.	I6−I·5, I8+3	II·9	
,, 2I	58	T.94	,,	Bl.	I3−3, I6+I	II·6	
,, 26	63	90	,,	Bh.	I2−5, I3−3, I6+I, 20+5	II·7	
Dec. I	68	,,	,,	,,	I8−I, =20	I2·3	
,, 3	70	T.94	,,	Bl.	I3−4, I6+0·5	II·7	
,, IO	77	I50	,,	Bh.	I6−4, =I8, =I9, 20+2	I2·I	
,, I8	85	90	,,	,,	I6−4, I8+I, 20+0·5	I2·I	
,, 23	90	,,	,,	,,	I6−4, I8+2, 20+2	I2·I	
,, 25	92	T.94	,,	Bl.	I6−2, A+3·5	II·9	
,, 3I	0498	90	,,	Bh.	I6−3, 20+3	I2·0	

(5504) S CORONÆ. (V. 2.)

H.D. 151731.

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Jan. 11	8683	t.75	1	Bn.	10−5·5, 11+3	10·8	
„ 12	84	T.94	„	Ni.	10−8, 14+8	11·0	
„ 17	8689	„	„	„	9−7, 10+2	10·1	In t.22, 10·2.
„ 30	8702	t.22	„	„	4−2, 5+4	8·0	Yellow.
Feb. 7	10	T.25	„	Bn.	2−6·5, 4+2	7·6	
„ 8	11	t.30	„	„	2−5·5, 4+3	7·5	
„ 9	12	t.22	„	Ni.	2−3·5, 4+5	7·3	Yellow.
„ 11	14	45	„	Br.	2−3, 4+5	7·3	
„ 12	15	t.22	„	Ni.	2−4, 4+4	7·4	
„ 15	18	t.30	„	Bn.	2−1·5, 4+7	7·1	
„ 21	24	45	„	Br.	2−1	7·1	
„ 21	24	t.22	„	Ni.	2−3·5, 4+5	7·3	Yellow.
„ 23	26	t.30	„	Bn.	2−4, 4+4	7·4	
Mar. 1	32	t.22	„	Ni.	4+4	7·4	
„ 3	34	45	„	Br.	2+2	6·8	
„ 7	38	„	„	„	2−2	7·2	
„ 13	44	t.22	„	Ni.	4+1	7·7	
„ 15	46	45	„	Br.	2−4, 4+5	7·3	
„ 16	47	T.25	„	Bn.	2−7, 4+1·5	7·7	
„ 16	47	t.22	„	Ni.	4+2	7·6	
„ 22	53	„	„	„	4+2	7·6	
„ 29	60	t.30	„	Bn.	4−5·5, 5+1	8·4	
„ 30	61	t.22	„	Ni.	4−5, 5+1	8·3	
„ 31	62	45	„	Br.	4−1, 5+3	8·0	
Apr. 1	63	t.30	„	Bn.	4−5, 5+1·5	8·3	
„ 2	64	„	„	„	4−5, 5+1·5	8·3	
„ 11	73	t.22	„	Ni.	5−1, 6+1	8·6	
„ 17	79	t.60	„	Bn.	7−1·5, 9+2	9·2	
„ 24	86	t.22	„	Ni.	6−1	8·9	
„ 25	87	45	2	Br.	5−1, 7+5	8·6	
„ 26	88	50	1	Ma.	=9	9·4	About.
„ 27	89	60	„	Gh.	7−2·5, =9, 10+10	9·3	
May 2	94	T.50	„	Bn.	7−1, 9+1	9·2	
„ 3	95	t.22	„	Ni.	9−2·5, 10+6	9·6	
„ 7	99	50	„	Ma.	6−1	8·9	
„ 7	8799	45	„	Br.	5−4, 7+2	8·9	
„ 9	8801	60	„	Gh.	=9	9·4	
„ 9	01	t.60	„	Bn.	9−5, 10+3	9·9	
„ 10	02	60	„	Bd.	9−6, 10+2	10·0	
„ 12	04	t.22	„	Ni.	9−5, 10+3·5	9·9	
„ 14	06	t.60	„	Bn.	9−3, 10+5	9·7	
„ 15	07	50	„	Ma.	9−3, 10+8	9·6	
„ 16	08	„	„	„	9−3	9·7	
„ 18	10	60	„	Br.	6−2, 7+1	9·0	
„ 22	14	T.94	„	Ni.	=9	9·4	In t.22, 9·7. Yellowish orange.
„ 27	19	60	„	Bd.	9−6, 10+2	10·0	
„ 27	19	„	„	Br.	9−5, 10+4	9·9	
„ 31	8823	„	„	Gh.	9−7·5, 10+2	10·1	

(5504) S CORONÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
June 1	8824	60	1	Bd.	=10	10·3	
,, 3	26	,,	,,	,,	=10	10·3	
,, 3	26	50	,,	Ma.	9−7, 10+1	10·1	
,, 5	28	T.94	,,	Ni.	9−7, 10+2	10·1	
,, 8	31	60	2	Bd.	10−3, 11+6	10·5	
,, 8	31	t.60	,,	Bn.	10−5·5, 11+3	10·8	
,, 13	36	50	1	Ma.	10+0·5	10·2	
,, 13	36	60	,,	Br.	9−3, 10+5	9·7	
,, 17	40	79	,,	Ma.	10−0·5	10·3	
,, 19	42	T.50	,,	Bn.	9−7, 10+1	10·1	
,, 19	42	60	2	Gh.	=10	10·3	
,, 22	45	79	1	Ma.	10−2	10·5	
,, 24	47	50	,,	,,	=10	10·3	
,, 25	48	60	2	Bd.	10−6, 11+2	10·9	
,, 26	49	79	1	Ma.	10−0·5	10·3	
,, 28	51	60	2	Bd.	10−6, 11+3	10·8	
,, 29	52	,,	,,	,,	10−6, 11+2	10·9	
July 1	54	T.94	1	Ni.	10−4, 14+11·5	10·7	
,, 3	56	160	,,	Br.	10−2	10·5	
,, 4	57	79	2	Ma.	10−5, 14+10	10·8	
,, 11	64	,,	1	,,	10−9, 14+6	11·2	
,, 11	64	T.94	,,	Ni.	10−8·5, 14+7	11·1	
,, 13	66	T.95	,,	Bn.	11−2, 12+0·5	11·3	
,, 22	75	79	,,	Ma.	10−7, 14+7	11·0	
,, 25	78	,,	,,	,,	10−12, 14+3	11·5	
,, 25	78	T.95	,,	Bn.	11−3, 13+1·5	11·4	
,, 27	80	T.94	,,	Ni.	=14	11·8	
,, 31	84	160	,,	Br.	=13	11·5	
,, 31	84	60	,,	Gh.	=13	11·5	
Aug. 2	86	79	,,	Ma.	13+1, 14+2	11·5	
,, 4	88	,,	,,	,,	14+0·5	11·8	
,, 6	90	60	2	Gh.	=14	11·8	
,, 7	91	79	1	Ma.	14+1	11·7	
,, 8	92	160	,,	Br.	=14	11·8	
,, 9	93	T.94	,,	Ni.	=14	11·8	
,, 10	94	79	,,	Ma.	14+1	11·7	
,, 10	94	120	,,	Gh.	=18	12·3	
,, 12	96	79	,,	Ma.	14−0·5	11·9	
,, 15	8899	,,	,,	,,	=14	11·8	
,, 19	8903	,,	2	,,	14−2	12·0	
,, 22	06	T.94	1	Ni.	14−3·5, 20+2	12·2	
,, 24	08	96	2	Cr.	=20	12·4	About.
,, 26	10	183	1	Ma.	14−2	12·0	
,, 30	14	160	2	Br.	18−1, 20+1	12·3	
,, 30	14	T.94	1	Ni.	20−1, 21+2	12·5	Record doubtful.
Sept. 2	17	320	,,	Br.	20−3, 29+6	12·7	
,, 3	18	183	,,	Ma.	14−5	12·3	
,, 17	32	160	2	Br.	20−4	12·8	
,, 21	36	T.94	1	Ni.	18−5, 29+6	12·8	
,, 30	8945	,,	2	,,	18−5, 29+5	12·8	

(5504) S CORONÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Oct. 2	8947	T.50	3	Bn.	20−2	12·6	About.
„ 9	54	240	1	Br.	20−6, 29+3	13·0	
„ 16	61	T.120	„	Bn.	<18	<12·3	Not seen.
„ 22	67	T.94	2	Ni.	18−1	12·4	
Nov. 1	77	T.120	1	Bn.	20−3	12·7	
„ 4	80	T.94	2	Ni.	=20	12·4	
„ 7	83	160	1	Br.	20−3	12·7	
„ 9	85	T.167	„	Bn.	20−2	12·6	
„ 11	87	240	„	Br.	20−2	12·6	
„ 20	96	T.120	„	Bn.	18−1, 20+0·5	12·4	
„ 20	8996	160	„	Br.	=20	12·4	
„ 29	9005	„	„	„	18−1, 20+1	12·3	
Dec. 4	10	T.94	„	Ni.	14−1	11·9	
„ 5	11	160	„	Br.	=14, 18+5	11·8	
„ 9	15	T.94	2	Ni.	=14	11·8	
„ 27	33	„	1	„	9−5, 10+3·5	9·9	In t.22, 10·1.
„ 27	33	t.60	„	Bn.	9−8, 10+1	10·2	
„ 29	35	„	„	„	9−7, 10+2	10·1	
1911.							
Jan. 2	39	t.22	2	Ni.	9−0·5	9·4	
„ 6	43	t.60	1	Bn.	7−2, 9+1	9·3	
„ 6	43	45	„	F.G.B.	7−2, 9+2	9·2	
„ 9	46	t.30	„	Bn.	5−4, 7+1	8·9	
„ 9	46	t.22	„	Ni.	5−1, 6+2	8·6	
„ 23	60	45	„	Br.	2−4, 4+4	7·4	
„ 29	66	t.22	„	Ni.	2−2	7·2	Orange yellow.
„ 30	67	45	„	Br.	2+0·5	6·9	
„ 31	68	T.25	„	Bn.	1−1·5, 2+1	6·9	
„ 31	68	30	„	Gh.	=2	7·0	
Feb. 6	74	t.22	„	Ni.	2+1	6·9	Orange yellow.
„ 11	79	45	„	Br.	2+2	6·8	
„ 11	79	T.25	„	Bn.	=1	6·7	
„ 19	87	t.22	„	Ni.	c+1, 2+3	6·4	Yellow.
„ 20	88	t.30	„	Bn.	1+0·5	6·7	
„ 25	93	45	„	Br.	2+2	6·8	
„ 25	93	T.25	„	Bn.	1+1	6·6	
Mar. 2	9098	„	„	„	1+4·5, 2+7	6·3	
„ 4	9100	160	„	Br.	2+2	6·8	
„ 5	01	t.22	„	Ni.	2+1	6·9	Orange yellow.
„ 7	03	T.25	2	Bn.	1−1, 2+1·5	6·8	
„ 9	05	„	1	„	1−1	6·8	
„ 19	15	t.22	„	Ni.	2+1	6·9	
„ 25	21	T.25	„	Bn.	1−1·5, 2+1	6·9	
„ 29	25	t.22	„	Ni.	2−4, 4+4·5	7·4	
„ 31	27	T.50	„	Bn.	2+1	6·9	
Apr. 3	30	T.25	„	„	2−1	7·1	
„ 3	30	45	„	Br.	2−1	7·1	
„ 3	30	t.22	„	Ni.	2−4, 4+4·5	7·4	Orange yellow.
„ 6	9133	„	„	„	2−4, 4+4·5	7·4	

(5504) S CORONÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
Apr. 13	9140	t.22	1	Ni.	2−5, 4+3·5	7·5	
,, 15	42	t.30	,,	Bn.	2−5·5, 4+3	7·5	
,, 18	45	45	,,	Br.	2−4, 4+5	7·3	
,, 19	46	,,	2	F.G.B.	=4	7·8	
,, 20	47	t.30	1	Bn.	2−7, 4+1·5	7·7	
,, 23	50	,,	,,	,,	4−1·5, 5+5	8·0	
,, 23	50	45	,,	F.G.B.	4−4, 5+2	8·2	
,, 26	53	,,	,,	Br.	4−3, 5+2	8·2	
,, 26	53	t.30	2	Bn.	4−5, 5+1·5	8·3	
,, 28	55	t.22	1	Ni.	5−0·5	8·5	
May 4	61	t.30	,,	Bn.	4−5·5, 5+1	8·4	
,, 5	62	t.22	,,	Ni.	=5	8·5	
,, 6	63	45	,,	F.G.B.	5−2, 7+4	8·7	
,, 15	72	t.22	,,	Ni.	6−1	8·9	
,, 15	72	45	,,	Br.	5−2, 7+4	8·7	
,, 19	76	60	,,	Bd.	=9	9·4	
,, 21	78	t.60	,,	Bn.	7−2·5, 9+1	9·3	
,, 22	79	45	,,	F.G.B.	=9	9·4	
,, 24	81	60	,,	Bd.	=9	9·4	
,, 25	82	,,	,,	,,	9−3, 10+6	9·7	
,, 25	82	t.22	,,	Ni.	6−5, 9+1	9·3	
,, 28	85	45	,,	Br.	5−2, 7+4	8·7	
,, 29	86	t.60	,,	Bn.	9−1, 10+7	9·5	
,, 29	86	34	2	Cr.	=9	9·4	
,, 30	87	60	1	Bd.	9−4, 10+4	9·8	
June 1	89	,,	,,	,,	9−2, 10+6	9·6	
,, 3	91	30	,,	Gh.	5−10, 7−4, =9	9·4	
,, 3	91	45	,,	F.G.B.	=9	9·4	
,, 4	9192	t.22	,,	Ni.	6−5, 9+1	9·3	
,, 13	9201	60	,,	Bd.	9−6, 10+3	10·0	
,, 15	03	,,	,,	,,	9−6, 10+2	10·0	
,, 17	05	45	,,	F.G.B.	9−1, 10+7	9·5	
,, 17	05	t.22	,,	Ni.	9−6, 10+3	10·0	
,, 19	07	45	,,	Br.	7−6, 9−3	9·7	
,, 19	07	60	,,	Bd.	=10	10·3	
,, 21	09	,,	,,	,,	=10	10·3	
,, 23	11	,,	,,	,,	10−2, 11+6	10·5	
,, 25	13	,,	,,	Gh.	7−10, 10+2·5	10·0	
,, 27	15	t.60	,,	Bn.	9−7, 10+2	10·1	
,, 28	16	60	,,	Bd.	10−4, 11+4	10·7	
July 2	20	45	,,	F.G.B.	=10	10·3	
,, 2	20	T.94	,,	Ni.	9−6, 10+2	10·0	
,, 10	28	,,	,,	,,	10+2·5	10·0	
,, 10	28	34	,,	Cr.	10+2	10·1	
,, 10	28	45	,,	F.G.B.	10−1·5, 11+7	10·4	
,, 10	28	t.60	,,	Bn.	9−8, 10+1	10·2	
,, 12	30	60	,,	Gh.	=10	10·3	
,, 18	36	,,	,,	,,	10−3, 14+12	10·6	
,, 21	39	,,	,,	Br.	10−4, 14+12	10·6	
,, 21	39	45	,,	F.G.B.	10−6, 11+3	10·8	
,, 21	39	T.94	,,	Ni.	10−4, 14+11	10·7	
,, 22	40	T.120	,,	Bn.	10−3, 13+9·5	10·6	
,, 27	9245	,,	,,	,,	10−8·5, 13+4	11·1	

(5504) S CORONÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
July 27	9245	34	1	Cr.	10−2	10·5	
,, 27	45	60	,,	Gh.	10−3, 14+12	10·6	
Aug. 1	50	160	,,	Br.	10−8, 14+8	11·0	
,, 1	50	T.120	,,	Bn.	10−9, 13+3·5	11·2	
,, 3	52	60	2	Gh.	10−9, 14+6	11·2	
,, 3	52	T.94	1	Ni.	10−13, 14+2	11·6	
,, 13	62	60	,,	Gh.	=14	11·8	
,, 14	63	45	2	F.G.B.	14−1, 17+1	11·9	
,, 14	63	T.94	1	Ni.	14+1·5	11·7	
,, 18	67	34	,,	Cr.	=14	11·8	
,, 24	73	160	2	Br.	14+3	11·5	
,, 24	73	T.94	1	Ni.	14−3, 20+2	12·2	
,, 25	74	120	,,	Gh.	14−2, 18+2	12·1	
Sept. 2	82	160	,,	Br.	=18	12·3	
,, 10	90	198	2	F.G.B.	18−1, 20+1	12·3	
,, 17	9297	160	,,	Br.	=18	12·3	
,, 21	9301	T.94	1	Ni.	18+1, 20−1	12·3	
,, 24	04	198	2	F.G.B.	=18	12·3	Difficult.
,, 26	06	T.120	1	Bn.	20−1	12·5	
,, 28	08	T.94	,,	Ni.	18−1	12·4	
Oct. 17	27	,,	,,	,,	18−4, 29+8	12·6	
,, 18	28	T.120	2	Bn.	=18	12·3	About.
,, 26	36	66	1	F.G.B.	=18	12·3	
,, 27	37	160	2	Br.	20−2	12·6	
,, 31	41	T.94	1	Ni.	14−5·5, 20+1	12·3	
Nov. 9	50	66	,,	F.G.B.	14−1, 18+4	11·9	
,, 11	52	T.94	,,	Ni.	14−4, 20+1	12·3	
,, 14	55	T.120	,,	Bn.	18−1, 20+0·5	12·4	
,, 20	61	160	,,	Br.	14−2, 18+2	12·1	
,, 21	62	T.94	2	Ni.	14−3, 20+3	12·1	
,, 29	70	T.120	1	Bn.	14−2, 18+2	12·1	
Dec. 4	75	160	2	Br.	10−10, 14+5	11·3	
,, 9	80	,,	,,	,,	10−12, 14+4	11·4	
,, 14	85	T.94	,,	Ni.	10−12, 14+3	11·5	
,, 17	88	,,	1	,,	10−11, 14+4·5	11·4	
,, 25	9396	132	,,	F.G.B.	10−1·5, 11+7	10·4	
,, 30	9401	T.94	2	Ni.	10+4	9·9	About. Uncertain.
1912.							
Jan. 17	19	t.22	1	,,	4+4	7·4	
,, 26	28	,,	,,	,,	=2	7·0	
Feb. 1	34	160	,,	Br.	2+1	6·9	
,, 2	35	t.22	,,	Ni.	2+2	6·8	
,, 8	41	160	,,	Br.	2+3	6·7	
,, 8	41	45	,,	F.G.B.	=2	7·0	
,, 10	43	t.22	,,	Ni.	c−2, 2+6	6·4	
,, 21	9454	,,	,,	,,	=c	6·2	

(5504) S CORONÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Mar. 6	9468	45	1	Br.	=1, 2+3	6·7	
,, 10	72	T.50	,,	Bn.	1+1·5	6·6	
,, 19	81	45	,,	Br.	2−1	7·1	
,, 19	81	t.22	,,	Ni.	2−3	7·3	
,, 30	92	..	..	,,	2−7, 4+2	7·6	
Apr. 1	9494	T.25	,,	Bn.	2−6·5, 4+2	7·6	
,, 9	9502	t.22	,,	Ni.	4−4, 5+2·5	8·2	
,, 13	06	45	,,	Br.	=5	8·5	
,, 19	12	,,	,,	F.G.B.	5−2, 7+4	8·7	
,, 20	13	t.22	,,	Ni.	5−2, 6+0·5	8·7	
,, 20	13	30	,,	Gh.	=7	9·1	
,, 22	15	45	,,	F.G.B.	5−1, 7+5	8·6	
,, 26	19	38	2	Gd.	7+4	8·7	
,, 26	19	t.22	1	Ni.	=6	8·8	
,, 27	20	45	,,	F.G.B.	=7	9·1	
,, 29	22	T.50	,,	Bn.	7+1	9·0	
May 6	29	t.22	2	Ni.	9−1	9·5	
,, 8	31	T.50	1	Bn.	7−2, 9+1	9·3	
,, 13	36	t.22	,,	Ni.	9−3, 10+6	9·7	
,, 16	39	45	,,	Br.	9−3	9·7	
,, 16	39	,,	,,	F.G.B.	9−4, 10+4	9·8	
,, 20	43	,,	,,	,,	9−3, 10+6	9·7	
,, 20	43	t.22	,,	Ni.	9−6, 10+2·5	10·0	
,, 24	47	T.50	,,	Bn.	9−4, 10+4	9·8	
,, 24	47	45	,,	F.G.B.	9−3·5, 10+6	9·7	
,, 24	47	30	2	Gh.	=9	9·4	
June 2	56	45	1	F.G.B.	9−6, 10+3	10·0	
,, 2	56	T.50	,,	Bn.	9−6, 10+3	10·0	
,, 6	60	,,	,,	,,	9−7, 10+2	10·1	
,, 6	60	45	,,	Br.	9−4, 10+4	9·8	
,, 6	60	T.94	,,	Ni.	10+4	9·9	In t.22, 10·3.
,, 10	64	30	,,	Gh.	=10	10·3	
,, 13	67	T.50	,,	Bn.	9−8, 10+1	10·2	
,, 18	72	T.94	,,	Ni.	=10	10·3	
,, 20	74	60	,,	Gh.	=10	10·3	
,, 21	75	T.95	,,	Bn.	10+1	10·2	
,, 23	77	60	,,	Br.	10−1	10·4	
July 5	89	T.120	,,	Bn.	10−11·5, 14+4	11·4	
,, 8	92	,,	,,	,,	10−9·5, 13+3	11·2	
,, 9	93	T.94	2	Ni.	10−9, 14+7	11·1	
,, 12	96	,,	1	,,	10−11, 14+4·5	11·4	
,, 14	9598	T.120	,,	Bn.	10−9·5, 13+3	11·2	
,, 18	9602	45	,,	Br.	14+2	11·6	
,, 23	07	T.94	,,	Ni.	14+1	11·7	
,, 30	14	,,	,,	,,	14+1	11·7	
,, 30	14	T.200	,,	Bn.	14−1	11·9	
Aug. 9	24	T.94	,,	Ni.	14−3, 20+2	12·2	
,, 19	34	,,	,,	,,	18+0·5, 20−2	12·4	
Sept. 2	48	160	2	Br.	20−5	12·9	About.
,, 4	9650	T.94	1	Ni.	=18	12·3	Doubtful. [C.L.B.]

(5504) S CORONÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Sept. 14	9660	T.94	1	Ni.	18−9, 29+2	13·2	
,, 18	64	160	2	Br.	21−3	13·0	
,, 20	66	T.94	1	Ni.	18−9, 29+1	13·2	
,, 22	68	T.120	,,	Bn.	<20	<12·4	Not seen.
Oct. 2	78	T.150	,,	,,	20−5	12·9	
,, 4	80	T.94	,,	Ni.	29+0·5	13·3	
,, 6	82	T.120	2	Bn.	<20	<12·4	Not seen.
,, 17	9693	160	1	Br.	=29	13·4	
,, 29	9705	,,	,,	,,	29+2	13·2	
Nov. 3	10	T.94	2	Ni.	29−0·5	13·4	
,, 11	18	160	1	Br.	29+2	13·2	
,, 13	20	T.120	,,	Bn.	<20	<12·4	Suspected.
,, 27	34	,,	,,	,,	<18	<12·3	Not seen.
Dec. 5	42	T.94	,,	Ni.	18−3, 29+8	12·6	
,, 12	49	,,	,,	,,	=20	12·4	
,, 16	53	,,	,,	,,	18+1, 20−1	12·3	
,, 20	57	,,	,,	,,	14−4, 20+1	12·3	
,, 25	62	,,	,,	,,	14−0·5	11·9	
,, 29	66	T.120	,,	Bn.	13−2, 14+1	11·7	
1913.							
Jan. 1	69	160	2	Br.	10−4	10·7	Difficult.
,, 4	72	T.94	1	Ni.	10−11, 14+4·5	11·4	
,, 9	77	,,	,,	,,	10−0·5	10·3	
,, 25	9793	t.22	,,	,,	=5	8·5	
Feb. 1	9800	T.50	,,	Bn.	4−1·5, 5+5	8·0	
,, 5	04	45	,,	Br.	4−3, 5+3	8·1	
,, 5	04	t.22	,,	Ni.	4+2	7·6	
,, 13	12	20	,,	La.	=4	7·8	
,, 14	13	t.22	,,	Ni.	2−3, f+1	7·3	
,, 22	21	,,	,,	,,	2−5, 4+2·5	7·5	
,, 26	25	45	,,	Br.	2−6, 4+3	7·5	
Mar. 3	30	20	,,	La.	=4	7·8	
,, 8	35	T.50	,,	Bn.	2−5·5, 4+3	7·5	
,, 8	35	t.22	,,	Ni.	2−5·5, 4+2	7·5	
,, 11	38	45	,,	Br.	2−4, 4+4	7·4	
,, 19	46	t.22	,,	Ni.	4+2	7·6	
,, 23	50	T.25	,,	Bn.	2−7·5, 4+1	7·7	
,, 25	52	60	,,	Br.	4−2, 5+4	8·0	
,, 30	57	T.50	,,	Bn.	4−2, 5+4·5	8·0	
Apr. 2	60	t.22	,,	Ni.	4−5·5, 5+1	8·4	
,, 9	67	,,	,,	,,	4−5, 5+1·5	8·3	
,, 20	78	,,	,,	,,	5−1, 6+1·5	8·6	
,, 22	80	50	2	Ma.	5−2·5	8·7	
,, 23	81	,,	1	,,	5−1	8·6	
,, 23	81	45	2	Bh.	6−2, =7, 8+2	9·0	
,, 25	83	,,	1	Br.	=7	9·1	
,, 27	85	,,	2	Bh.	7−1	9·2	
,, 27	85	t.22	1	Ni.	=9	9·4	
,, 28	9886	20	,,	La.	5−3, =6	8·8	

(5504) S CORONÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
May 1	9889	T.50	1	Bn.	7−2, 9+1	9·3	
,, 1	89	50	,,	Ma.	7−3, 9+0·5	9·3	
,, 1	89	30	,,	Gh.	=9	9·4	
,, 2	90	50	,,	Ma.	7−1, 9+2	9·2	Ruddy.
,, 2	90	45	2	Bh.	=9	9·4	
,, 4	92	,,	,,	,,	9−2, 10+5	9·7	
,, 5	93	40	1	La.	9−4, 10+5	9·8	
,, 6	94	,,	,,	,,	9−1, 0+1	9·5	
,, 7	95	t.22	,,	Ni.	9−4, 10+5	9·8	
,, 9	97	45	,,	Br.	9−2, 10+6	9·6	
,, 9	97	40	,,	La.	9−3, 0+1	9·6	
,, 9	97	50	2	Ma.	9−2	9·6	
,, 10	98	T.50	1	Bn.	7−3, =9	9·4	
,, 10	9898	30	,,	Gh.	9−4, 10+4	9·8	
,, 13	9901	T.50	,,	Bn.	9−2, 10+7	9·6	
,, 13	01	50	,,	Ma.	9−2·5	9·6	
,, 14	02	45	2	Bh.	9−4, 10+3	9·9	
,, 14	02	T.94	1	Ni.	=9	9·4	In t.22, 9·8.
,, 16	04	30	2	Gh.	=9	9·4	
,, 16	04	50	,,	Ma.	=9	9·4	
,, 21	09	45	,,	Bh.	9−5, 10+3·5	9·9	
,, 21	09	40	1	La.	0−2, 10+4	9·9	
,, 24	12	50	,,	Ma.	9−3, 10+6	9·7	
,, 25	13	45	,,	Br.	9−2, 10+6	9·6	
,, 25	13	90	,,	Bh.	9−6, 10+2	10·0	
,, 25	13	34	2	Cr.	7−2, 9+2	9·2	Doubtful. [C.L.B.]
,, 25	13	30	1	Gh.	9−4, 10+4	9·8	
,, 26	14	t.22	,,	Ni.	9−7, 10+1	10·1	
,, 28	16	40	,,	La.	0−3, 10+3	10·0	Red.
,, 29	17	T.50	,,	Bn.	9−7, 10+1	10·1	
,, 30	18	30	,,	Gh.	9−5, 10+3·5	9·9	
,, 31	19	T.50	,,	Bn.	10+2	10·1	
,, 31	19	50	,,	Ma.	10+2·5	10·0	
June 2	21	34	2	Cr.	=9	9·4	Doubtful. [C.L.B.]
,, 3	22	T.50	1	Bn.	10−1, 11+8	10·3	
,, 7	26	79	,,	Ma.	10+2	10·1	
,, 7	26	T.94	,,	Ni.	=10	10·3	In t.22, 10·4.
,, 7	26	160	,,	Br.	10−1	10·4	
,, 8	27	40	,,	La.	10+1	10·2	
,, 8	27	30	,,	Gh.	9−7, 10+1	10·1	
,, 8	27	75	2	Ch.	=10	10·3	
,, 14	33	90	1	Bh.	=10	10·3	
,, 14	33	T.94	,,	Ni.	10−0·5	10·3	
,, 16	35	60	2	Gh.	=10	10·3	
,, 17	36	34	1	Cr.	=10	10·3	
,, 21	40	90	2	Bh.	10−4, 13+8	10·7	
,, 23	42	75	1	Ch.	10−3	10·6	
,, 27	46	T.95	,,	Bn.	11−1, 12+1·5	11·2	
,, 27	46	90	2	Bh.	10−5, 14+10	10·8	
,, 27	46	75	,,	Ch.	10−3, 14+12	10·6	
July 3	52	T.95	,,	Bn.	13−1, 14+1	11·7	
,, 8	57	90	,,	Bh.	10−7, 14+7	11·0	
,, 8	57	T.94	,,	Ni.	10−12, 14+3·5	11·5	
,, 11	9960	T.120	,,	Bn.	13−1, 14+2	11·6	

(5504) S CORONÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
July 11	9960	183	2	Ma.	14+0·5	11·8	
,, 20	69	T.120	,,	Bn.	14−3, 18+1·5	12·1	
,, 24	73	79	,,	Ma.	14+1, 18+1	12·0	
,, 25	74	90	,,	Bh.	=18, =19, =20	12·4	
,, 29	78	T.120	1	Bn.	20−1	12·5	
,, 30	79	150	,,	Bh.	18−2, =19, =20	12·4	
,, 31	80	183	,,	Ma.	=18	12·3	
Aug. 2	82	160	,,	Br.	14−2, 18+2	12·1	
,, 2	82	90	2	Bh.	=20, =21	12·5	
,, 3	83	183	,,	Ma.	18+1, 19+1	12·3	
,, 5	85	,,	1	,,	=20	12·4	
,, 6	86	90	,,	Bh.	=20, =21	12·5	
,, 12	92	T.94	,,	Ni.	20−1, 18+1	12·3	
,, 16	9996	90	2	Bh.	20−2, 21+1	12·6	
,, 22	0002		1	Ch.	19−3, 29+6	12·8	
,, 22	02	T.94	,,	Ni.	18−6, 29+4	12·9	
,, 24	04	160	,,	Br.	21−2, 29+4	12·9	
,, 27	07	150	,,	Bh.	19−2, 20−1, =21	12·6	
,, 28	08	T.94	,,	Ni.	18−7, 29+3·5	13·0	
Sept. 2	13	150	2	Bh.	19−1, =21	12·6	
,, 3	14	183	1	Ma.	20−1·5	12·6	
,, 6	17	T.200	,,	Bn.	20−4	12·8	
,, 6	17	T.94	,,	Ni.	18−9, 29+1·5	13·2	
,, 7	18	160	2	Br.	20−5	12·9	About. Difficult.
,, 7	18	183	,,	Ma.	20−2	12·6	
,, 9	20	90	1	Bh.	21−0·5	12·7	
,, 16	27	183	2	Ma.	<14	<11·8	Not seen.
,, 19	30	T.94	1	Ni.	=29	13·4	
,, 21	32	120	,,	Br.	20−7	13·1	About.
,, 24	35	150	,,	Bh.	21−4, 29+4	13·0	
,, 27	38	120	,,	Br.	20−6, 29+2	13·1	
,, 27	38	T.94	,,	Ni.	18−9, 29+3	13·1	
,, 30	41	,,	,,	,,	18−10, 29+1	13·3	
Oct. 6	47	,,	,,	,,	=29	13·4	
,, 19	60	120	,,	Br.	20−6	13·0	About.
,, 20	61	T.94	2	Ni.	29−1	13·5	Difficult.
,, 25	66	,,	,,	,,	=29	13·4	,,
,, 31	72	120	,,	Br.	20−6	13·0	About.
Nov. 8	80	150	1	Bh.	<21	<12·7	Not seen.
,, 9	81	,,	,,	,,	=18	12·3	
,, 21	93	90	,,	,,	18−2, =19	12·5	
,, 22	94	,,	,,	,,	=18, =19	12·4	
,, 22	94	T.50	,,	Bn.	20−5	12·9	
,, 22	94	T.94	,,	Ni.	18−5, 29+5	12·8	
,, 24	0096	120	,,	Br.	20−3	12·7	
Dec. 6	0108	T.94	,,	Ni.	18−3, 29+7	12·6	
,, 9	11	90	2	Bh.	=17, =18, =19	12·3	
,, 18	20	T.94	1	Ni.	=18	12·3	
,, 23	0125	90	,,	Bh.	14−1·5, =16, 18+3	12·0	

(5504) S CORONÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Dec. 24	0126	T.94	1	Ni.	14−4, 18+2, 20+1	12·2	
,, 29	31	150	,,	Bh.	14−1·5, =16, 18+3	12·0	
,, 30	32	T.94	,,	Ni.	14+1	11·7	
1914.							
Jan. 1	34	45	,,	Bh.	10−8, 14+8	11·0	
,, 5	38	90	2	,,	=10	10·3	
,, 6	39	,,	1	,,	10+2	10·1	
,, 6	39	T.95	,,	Bn.	10−5, 11+3	10·8	
,, 11	44	T.94	,,	Ni.	9−5, 10+3	9·9	
,, 17	50	t.22	,,	,,	5−3, 6−1·5	8·8	
,, 18	51	45	2	Bh.	4−7, 5−2	8·6	
,, 25	58	,,	1	,,	4−3, 5+3	8·1	
,, 25	58	t.22	,,	Ni.	4−3, 5+3	8·1	
,, 29	62	45	2	Bh.	=4, 5+5	7·9	
Feb. 3	67	90	,,	,,	4+2, 5+10	7·5	
,, 4	68	T.50	1	Bn.	2−6·5, 4+2	7·6	
,, 4	68	t.22	,,	Ni.	4−1·5, 5+5	8·0	
,, 12	76	,,	,,	,,	4−2·5, 5+4	8·1	
,, 15	79	T.50	,,	Bn.	4−5, 5+1·5	8·3	
,, 15	79	45	,,	Bh.	2−5, 4+3·5	7·5	
,, 18	82	,,	,,	,,	2−6, 4+3	7·5	
,, 18	82	T.50	,,	Bn.	4−4·5, 5+2	8·3	
,, 22	86	45	,,	Br.	4−2, 5+4	8·0	
,, 22	86	T.50	,,	Bn.	2−6·5, 4+2	7·6	
,, 23	87	45	,,	Bh.	2−3, 4+6	7·2	
,, 26	90	90	,,	,,	2−2, 4+6	7·2	
,, 26	90	T.50	,,	Bn.	4−2, 5+4·5	8·0	
Mar. 1	93	t.22	,,	Ni.	2−7, 4+1	7·7	
,, 6	98	T.50	,,	Bn.	4−4·5, 5+2	8·3	
,, 7	0199	90	,,	Bh.	2−6, 4+2	7·6	
,, 11	0203	t.22	,,	Ni.	2−6, 4+2	7·6	Yellow.
,, 12	04	45	2	Bh.	2−5, 4+3·5	7·5	
,, 16	08	,,	1	Br.	4+3	7·5	
,, 16	08	75	,,	Ch.	4−3, 5+3	8·1	
,, 21	13	T.50	,,	Bn.	2−6·5, 4+2	7·6	
,, 22	14	t.22	,,	Ni.	2−7, 4+1·5	7·7	Orange yellow.
,, 25	17	45	,,	Bh.	4−2, 5+4	8·0	
,, 27	19	,,	,,	Br.	4+1	7·7	
,, 29	21	,,	,,	Bh.	2−8, 4+2	7·7	
,, 31	23	T.50	,,	Bn.	4−5·5, 5+2	8·3	
,, 31	23	75	2	Ch.	5+1	8·4	
Apr. 4	27	t.22	,,	Ni.	4−4, 5+1	8·3	Orange yellow.
,, 6	29	45	1	Bh.	4−1, 5+4	8·0	
,, 12	35	75	,,	Ch.	5−1	8·6	
,, 14	37	45	,,	Bh.	4−3, 5+3	8·1	
,, 14	37	50	,,	Ma.	5−2·5	8·7	
,, 14	37	t.22	,,	Ni.	=5	8·5	
,, 15	38	45	,,	Br.	=5	8·5	
,, 18	41	30	,,	Gh.	=5	8·5	
,, 19	42	45	,,	Bh.	=5	8·5	
,, 23	0246	50	,,	Ma.	7−2, 9+2	9·2	

(5504) S CORONÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Apr. 23	0246	t.22	1	Ni.	5−2, 6+1	8·7	
„ 25	48	T.50	„	Bn.	5−4, 7+2	8·9	
„ 25	48	34	„	Cr.	5−2, 6+1	8·7	
„ 25	48	30	„	Gh.	5−3, =6, 7+2	8·8	
„ 26	49	45	„	Br.	5−2, 7+4	8·7	
„ 26	49	„	„	Bh.	5−4, 7+2	8·9	
„ 27	50	50	„	Ma.	7+1·5	8·9	
„ 28	51	t.30	„	Bn.	5−4, 7+1	8·9	
„ 30	53	45	„	Bh.	7−6, 9+2, 10+6	9·5	
May 2	55	40	„	Bc.	5−3, =6	8·8	
„ 2	55	45	„	Bh.	7−2, 9+1	9·3	
„ 2	55	75	„	Ch.	5−3, 7+3	8·8	
„ 6	59	40	„	Bc.	6−2, =7	9·0	
„ 9	62	90	„	Bh.	9−4, 10+4	9·8	
„ 12	65	75	2	Ch.	=7	9·1	
„ 14	67	90	1	Bh.	9−3, 10+5	9·7	
„ 15	68	30	„	Gh.	=9	9·4	
„ 15	68	79	„	Ma.	10+5	9·8	
„ 15	68	t.22	„	Ni.	9−5, 0−1, 10+4	9·8	
„ 16	69	45	„	Br.	9−2, 10+6	9·6	
„ 16	69	34	„	Cr.	=7	9·1	Doubtful. [C.L.B.]
„ 17	70	T.50	„	Bn.	9−2, 10+6	9·6	
„ 21	74	30	„	Gh.	=9	9·4	
„ 24	77	T.50	„	Bn.	9−6, 10+3	10·0	
„ 26	79	45	„	Br.	9−4, 10+4	9·8	
June 3	87	90	„	Bh.	9−5, 10+3	9·9	
„ 3	87	T.94	„	Ni.	9−6, 10+2·5	10·0	
„ 5	89	40	„	Bc.	=9, 0+3	9·4	
„ 10	94	90	„	Bh.	10+2	10·1	
„ 14	98	160	„	Br.	9−6, 10+3	10·0	
„ 14	0298	T.95	„	Bn.	10+1	10·2	
„ 22	0306	45	„	Bh.	9−7, 10+1·5	10·1	
„ 24	08	T.95	„	Bn.	=10	10·3	
„ 25	09	160	2	Br.	10−3	10·6	
„ 27	11	79	1	Ma.	10−1·5	10·4	
„ 29	13	T.94	„	Ni.	=10	10·3	
„ 30	14	T.95	„	Bn.	10−4, 11+4	10·7	
July 1	15	40	„	Bc.	10+1	10·2	
„ 4	18	„	2	„	10−3	10·6	
„ 4	18	150	1	Bh.	=10	10·3	
„ 4	18	T.95	„	Bn.	10−5, 11+3	10·8	
„ 7	21	T.94	„	Ni.	10−4, 14+11	10·7	
„ 9	23	79	„	Ma.	10−2	10·5	
„ 14	28	90	„	Bh.	=10	10·3	
„ 15	29	79	„	Ma.	10−10, 14+5	11·3	
„ 16	30	T.94	2	Ni.	10−9, 14+6·5	11·2	
„ 17	31	T.95	1	Bn.	10−7, 11+1	11·0	
„ 17	31	75	„	Ch.	10−9, 14+6	11·2	
„ 18	32	90	„	Bh.	10−1	10·4	
„ 23	37	79	„	Ma.	10−12, 14+4	11·4	
„ 25	39	„	„	„	10−14, 14+2	11·6	
„ 27	41	T.94	„	Ni.	10−11·5, 14+4	11·4	
„ 28	0342	90	„	Bh.	10−6, 14+9	10·9	

(5504) S CORONÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Aug. 2	0347	183	1	Ma.	14+1·5	11·7	
,, 3	48	160	,,	Br.	10−10, 14+5	11·3	
,, 5	50	90	,,	Bh.	10−5, 14+10	10·8	
,, 7	52	75	,,	Ch.	13−2, 14+2	11·7	
,, 10	55	T.94	,,	Ni.	10−14, 14+1·5	11·7	
,, 11	56	140	,,	Ch.	=14	11·8	
,, 14	59	,,	,,	,,	=14	11·8	
,, 17	62	T.94	,,	Ni.	10−14·5, 14+1	11·7	
,, 21	66	160	,,	Br.	14−1·5, 18+3	12·0	
,, 21	66	90	,,	Bh.	=13, 14−1, 18+3	11·8	
,, 21	66	75	2	Ch.	14−3, 19+3	12·1	
,, 25	70	,,	,,	,,	19+1	12·3	
,, 26	71	T.95	1	Bn.	14−1·5, 18+3	12·0	
,, 28	73	90	,,	Bh.	13−3, 14−2, 18+2	12·0	
,, 30	75	T.120	,,	Bn.	14−2, 18+2	12·1	
Sept. 1	77	90	,,	Bh.	14−3, 18+1·5	12·1	
,, 2	78	T.94	,,	Ni.	=14	11·8	
,, 5	81	75	2	Ch.	19+1	12·3	
,, 10	86	120	1	Br.	=18	12·3	
,, 10	86	T.150	,,	Bn.	14−3·5, 18+1	12·2	
,, 15	91	90	,,	Bh.	14−6, =18, 20+2	12·3	
,, 17	93	T.120	2	Bn.	18+1	12·2	
,, 17	93	T.94	1	Ni.	=14	11·8	
,, 23	99	160	,,	Br.	14−2, 18+2	12·1	
,, 23	0399	150	,,	Bh.	18−1, 19+1, =20	12·4	
,, 24	0400	T.94	,,	Ni.	14−3, 20+3	12·1	
Oct. 10	16	90	,,	Bh.	18−2, 20+1	12·4	
,, 11	17	T.120	,,	Bn.	=14	11·8	
,, 11	17	T.94	,,	Ni.	10−13·5, 14+2	11·6	
,, 18	24	90	2	Bh.	18−3, 20−0·5	12·5	
,, 27	33	,,	1	,,	18−1, =19	12·4	
Nov. 3	40	,,	,,	,,	14−1, 18+3	12·0	
,, 7	44	,,	,,	,,	10−12, 14+4	11·4	
,, 7	44	45	,,	Br.	10−7, =11, 14+7	11·1	
,, 13	50	T.94	2	Ni.	10−9, 14+6	11·2	
,, 14	51	T.120	1	Bn.	10−4, 11+4	10·7	
,, 14	51	90	,,	Bh.	10−10, 14+5	11·3	
,, 16	53	T.94	,,	Ni.	=10	10·3	
,, 17	54	90	,,	Bh.	10−1·5	10·4	
,, 18	55	T.95	,,	Bn.	10−1, 11+6	10·4	
,, 18	55	T.94	,,	Ni.	10−1	10·4	
,, 19	56	90	,,	Bh.	10−3, 14+12	10·6	
,, 24	61	T.94	,,	Ni.	10+0·5	10·2	
,, 26	63	90	,,	Bh.	10+1, 11−1, 12+1	10·9	
Dec. 5	72	T.50	,,	Bn.	9−7, 10+2	10·1	
,, 7	74	45	,,	Bh.	9−6, 10+3	10·0	
,, 10	77	,,	2	,,	7−3, 9−2	9·5	
,, 16	0483	T.94	1	Ni.	9−3, 10+6	9·7	

(5504) S CORONÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Dec. 18	0485	45	1	Bh.	=9	9·4	
,, 20	87	,,	,,	,,	5−6, =7, 9+3	9·1	
,, 21	88	T.94	,,	Ni.	=9	9·4	
,, 23	90	90	,,	Bh.	7−1, 9+3	9·1	
,, 24	91	t.22	,,	Ni.	6−3, 9+4	9·0	
,, 26	93	45	,,	Bh.	4−5, 5−1	8·4	
,, 31	0498	,,	,,	,,	4+3, 5+6	7·7	

(5601) S URSÆ MINORIS. (V. 2.)

H.D. 153378.

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Nov. 6	8982	160	1	Br.	7−3, 12+1	8·7	
,, 28	9004	60	,,	Gh.	7−4, =12, 18+4	8·8	
,, 28	04	40	,,	Hw.	12−3, 19+2	9·1	
Dec. 6	12	30	,,	Gh.	7−1, 8−2, 10+1, 12+4	8·6	
,, 9	15	40	2	Hw.	7−3, 12+1	8·7	
,, 19	25	,,	1	,,	7−2, 12+2	8·6	
,, 28	34	30	,,	Gh.	5−1, =7, 12+5	8·3	
1911.							
Jan. 1	38	t.30	,,	Bn.	8−0·5	8·5	
,, 6	43	40	,,	Hw.	7−2, 12+1·5	8·6	
,, 7	44	t.30	,,	Bn.	7−1, 8+1, 9+1	8·4	
,, 7	44	30	,,	Gh.	3−3, =5, 7+2	8·2	
,, 23	60	40	2	Hw.	3−4·5, 7+1	8.3	
,, 28	65	30	1	Gh.	3−3, =4, 7+2	8·1	
,, 30	67	,,	,,	,,	3−3, =5, 7+2	8·2	
,, 31	68	t.30	,,	Bn.	=7, 9+1	8·5	
Feb. 11	79	40	,,	Hw.	7−1·5, 12+2	8·6	
,, 22	90	30	2	Gh.	7−2, 12+2	8·6	
,, 25	9093	T.25	1	Bn.	7−1, =9	8·6	
Mar. 4	9100	40	,,	Hw.	=12	8·8	
,, 9	05	T.25	,,	Bn.	=10, 12+1, 13+1	8·8	
,, 24	20	40	,,	Hw.	19−3·5, 25+8	9·7	
,, 31	27	T.50	,,	Bn.	21−4, 25+2	10·3	
Apr. 3	30	,,	,,	,,	20−1, 21+2	9·7	
,, 6	33	40	2	Hw.	12−10, 29+10	9·8	
,, 29	9156	90	,,	,,	29−1, 30+3	10·9	

(5601) S URSÆ MINORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
May 9	9166	90	1	Hw.	29−1, 30+3·5	10·9	
,, 10	67	T.120	,,	Bn.	=29	10·8	
,, 15	72	t.120	2	,,	=26, =29	10·8	
,, 22	79	T.120	1	,,	=29	10·8	
,, 22	79	90	,,	Hw.	30−3, 31+1	11·5	
,, 22	79	45	2	Bi.	25−2, 29+1	10·7	Difficult.
,, 27	84	T.120	1	Bn.	29+1	10·7	
,, 28	85	200	2	Bi.	29−2, 30+2	11·0	
,, 29	86	34	1	Cr.	=29	10·8	
,, 31	88	200	2	Bi.	=32	12·2	
June 2	90	T.120	1	Bn.	=26, =29	10·8	
,, 3	91	180	2	Gh.	=32	12·2	About.
,, 7	95	34	1	Cr.	=29	10·8	
,, 9	9197	200	,,	Bi.	=31	11·6	
,, 15	9203	,,	2	,,	=31	11·6	
,, 18	06	120	,,	Gh.	=32	12·2	About.
,, 20	08	200	,,	Bi.	31−5, 32+1	12·1	
,, 28	16	60	,,	Gh.	=33	12·5	About.
July 2	20	200	1	Bi.	=31	11·6	
,, 11	29	34	,,	Cr.	25−2, 29+2	10·6	
,, 12	30	120	2	Gh.	=32	12·2	
,, 12	30	200	1	Bi.	=31	11·6	
,, 18	36	120	2	Gh.	=33	12·5	
,, 21	39	,,	,,	,,	=32	12·2	
,, 21	39	T.50	1	Bn.	=26, =29	10·8	
,, 21	39	34	,,	Cr.	=25	10·5	
,, 24	42	200	,,	Bi.	25−4, =29	10·8	
,, 28	46	,,	,,	,,	29−3, 30+1	11·1	
,, 30	48	120	,,	Gh.	=31	11·6	
Aug. 1	50	T.50	,,	Bn.	29+1	10·7	
,, 1	50	200	,,	Bi.	29−3, 30+1	11·1	
,, 3	52	60	2	Gh.	=31	11·6	Uncertain.
,, 7	56	240	1	Br.	29−1	10·9	
,, 9	58	40	2	Hw.	=29	10·8	
,, 13	62	60	1	Gh.	25−2, 29+2	10·6	
,, 14	63	200	,,	Bi.	25−3, 29+1	10·7	
,, 20	69	,,	,,	,,	25−3, 29+1	10·7	
,, 25	74	60	,,	Gh.	=25	10·5	
,, 28	77	45	,,	Br.	22−3, =24, 25+2	10·3	
,, 29	78	90	,,	Hw.	29+2, 30+6·5	10·6	
Sept. 2	82	45	,,	Bi.	=20	9·6	
,, 2	82	60	,,	Gh.	=25	10·5	
,, 3	83	34	,,	Cr.	25+5	10·0	
,, 15	95	60	,,	Gh.	=23, =24	10·2	
,, 18	9298	40	2	Hw.	19−8, 25+3·5	10·1	
,, 24	9304	30	1	Gh.	=19	9·3	
,, 24	04	60	,,	Br.	7−2, 12+3	8·6	
Oct. 6	16	40	2	Hw.	=19	9·3	
,, 10	20	60	1	Gh.	=12	8·8	
,, 17	27	30	,,	,,	=7, 12+4, 17+8	8·4	
,, 25	9335	,,	,,	,,	=7	8·4	

(5601) S URSÆ MINORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
Oct. 25	9335	T.50	1	Bn.	7−1, 12+3	8·5	
,, 28	38	90	,,	Hw.	7−1, 12+3	8·5	
,, 30	40	30	,,	Gh.	=7	8·4	
,, 31	41	t.30	,,	Bn.	7−2, =9, 10+1, 12+1	8·7	
Nov. 12	53	60	,,	Gh.	7−2, 12+2	8·6	
,, 25	66	90	2	Hw.	7−3, 12+1	8·7	
Dec. 2	73	40	1	Gi.	3−5, 6+2, 7+2	8·3	
,, 9	80	90	2	Hw.	7−1, 12+3	8·5	
,, 9	80	30	1	Gh.	3−5, 6+1	8·4	
,, 10	81	40	,,	Gi.	=5, 6+3	8·2	
,, 15	86	,,	2	Hw.	7−1, 12+3	8·5	
,, 17	88	,,	1	Gi.	4−2, 5+2	8·1	
,, 19	90	T.25	,,	Bn.	5−1·5, 7+1	8·3	
,, 25	9396	40	,,	Gi.	4−2, 5+1	8·2	
,, 31	9402	,,	2	,,	5+1	8·1	
1912.							
Jan. 8	10	,,	1	,,	5−2, =6	8·5	
,, 12	14	,,	2	,,	7−2, =8	8·5	
,, 26	28	T.50	1	Bn.	7−3, 10−1, =11, 12+1	8·8	
,, 27	29	40	2	Hw.	7−10, 12−6	9·4	
Feb. 15	48	,,	,,	La.	=23	10·1	
,, 18	51	75	1	Gi.	12−2, 20+1	9·2	
Mar. 5	67	40	,,	La.	24−2, 25+1	10·4	
,, 8	70	,,	,,	,,	=25	10·5	
,, 10	72	,,	,,	,,	25+1	10·4	
,, 13	75	,,	,,	,,	25−2, 29+2	10·6	
,, 13	75	,,	2	Gi.	20−5, 26+3	10·3	
,, 15	77	,,	1	,,	20−4, 26+3	10·2	
,, 15	77	,,	2	La.	25−1, 29+2	10·6	
,, 19	81	,,	,,	,,	25−2, 29+1	10·7	
,, 19	81	,,	,,	Gi.	26+3	10·5	
,, 21	83	,,	,,	La.	25−2, 29+1	10·7	
,, 23	85	,,	,,	Gi.	=25	10·5	
Apr. 3	96	T.95	1	Bn.	29+2	10·6	
,, 3	96	40	2	La.	=29	10·8	
,, 4	97	,,	1	,,	=29	10·8	
,, 4	9497	70	2	Gi.	25−4, 29+2	10·7	
,, 7	9500	40	,,	La.	=30	11·2	
,, 8	01	,,	,,	,,	30−1, 31+2·5	11·3	
,, 10	03	70	1	Gi.	=29	10·8	
,, 20	13	120	,,	Gh.	=29	10·8	
,, 22	15	40	,,	Gi.	=29	10·8	
,, 25	18	,,	2	,,	29−3, 32+0·5	11·6	
,, 26	19	,,	,,	,,	=32	12·2	
May 3	26	,,	,,	,,	29−3, 32+3	11·5	
,, 9	9532	,,	,,	,,	=32	12·2	

(5601) S URSÆ MINORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
May 9	9532	40	2	La.	30−2, 31+2	11·4	About. Difficult.
,, 11	34	,,	3	,,	=31, 32+5	11·7	
,, 11	34	,,	2	Gi.	=32	12·2	
,, 14	37	,,	1	,,	=32	12·2	
,, 18	41	,,	,,	,,	=32	12·2	
,, 24	47	120	2	Gh.	=32	12·2	
June 2	56	40	,,	Gi.	=32	12·2	
,, 4	58	,,	3	La.	30−6, 32+3	11·9	
,, 5	59	T.120	1	Bn.	30+1	11·1	
,, 8	62	40	,,	Gi.	=29	10·8	
,, 10	64	,,	,,	,,	=29	10·8	
,, 10	64	T.120	,,	Bn.	=31	11·6	
,, 10	64	120	,,	Gh.	=30	11·2	
,, 11	65	40	3	La.	=31, 32+4	11·7	Difficult.
,, 14	68	,,	2	Gi.	29−2	11·0	
,, 17	71	,,	,,	,,	=29	10·8	Difficult.
,, 20	74	120	1	Gh.	=30	11·2	
,, 25	79	40	2	Gi.	=25	10·5	Difficult.
July 5	89	,,	,,	La.	=29	10·8	
,, 10	94	,,	,,	Gi.	20−5, 25+3	10·1	Difficult.
,, 13	97	,,	1	,,	20−3, 25+3	10·0	,,
,, 13	97	,,	2	La.	24−1, 25+1	10·3	
,, 15	9599	T.95	1	Bn.	21−3, 25+3	10·2	
,, 17	9601	40	,,	La.	=24, 25+2	10·2	
,, 23	07	,,	,,	Gi.	12−3·5, 19+2	9·1	
,, 24	08	,,	2	La.	20−3, =22	9·9	
,, 28	12	,,	1	Gi.	12−2, 19+4	9·0	
,, 30	14	90	2	Bh.	18−1, 20+1	9·4	
,, 31	15	40	1	La.	=20	9·6	
Aug. 3	18	,,	,,	Gi.	12−2, 19+3·5	9·0	
,, 4	19	,,	2	La.	=20	9·6	
,, 9	24	,,	,,	,,	=19	9·3	
,, 10	25	,,	1	Gi.	12−1, 19+5	8·9	
,, 11	26	45	2	Bh.	=16, =17	9·2	
,, 16	31	40	1	La.	=19	9·3	
,, 17	32	,,	,,	Gi.	7−3, 12+1	8·7	
,, 19	34	,,	2	La.	=19	9·3	
,, 20	35	45	,,	Bh.	9−3, =13, 17+3	8·9	Very red.
,, 23	38	40	1	Gi.	7−3·5, 12+1	8·7	
,, 24	39	20	,,	La.	=19	9·3	
,, 27	42	40	,,	Gi.	7−4, 12+2	8·7	
,, 27	42	45	2	Bh.	=12	8·8	
,, 30	45	,,	1	,,	6−3, =10, =12, 16+3	8·8	
Sept. 2	48	,,	,,	,,	9−2, =10, 14+2	8·8	
,, 2	48	T.95	,,	Bn.	12+1	8·7	
,, 3	49	40	2	La.	19−1, 20+1·5	9·4	
,, 6	52	45	,,	Bh.	7−2, =9, 10+2	8·6	
,, 7	53	40	1	Gi.	7−3, 12+2	8·7	
,, 8	54	,,	2	La.	19−1, 20+1	9·4	
,, 14	60	,,	1	Gi.	7−3, 12+2	8·7	
,, 17	63	,,	2	Hw.	12−1, 19+4	8·9	
,, 18	9664	,,	1	Bh.	=10, =11, =12, =13	8·9	Scarlet.

(5601) S URSÆ MINORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Sept. 20	9666	T.50	1	Bn.	7−1, 9+1	8·5	
,, 21	67	45	,,	Bh.	6−3, =12, =13, 16+3	8·9	
,, 22	68	T.50	,,	Bn.	7−1, =9	8·6	
Oct. 2	78	,,	,,	,,	7−3, 12+1	8·7	
,, 2	78	40	,,	Gi.	7−3, 12+3	8·6	
,, 2	78	45	2	Bh.	6−2, 7−4, 12+2, 17+4	8·7	
,, 2	78	40	1	La.	7−1, 12+3	8·5	
,, 4	80	45	,,	Bh.	=6, 7−2, =9, 12+2	8·6	
,, 7	83	,,	2	,,	=6, =7, =8	8·4	
,, 8	84	40	,,	Hw.	7−3, 12+1	8·7	
,, 10	86	T.50	1	Bn.	7−3, 10+2, 12+1	8·7	
,, 10	86	40	2	Gi.	7−2, 12+3	8·6	
,, 13	89	,,	1	La.	=7, =8	8·4	
,, 15	91	20	,,	,,	7−1, 12+3	8·5	
,, 19	95	45	2	Bh.	5−1, 8+1	8·3	
,, 20	96	40	,,	Gi.	=5, 6+1, 7+1	8·3	
,, 20	96	20	1	La.	5−1, =7	8·4	
,, 22	9698	45	2	Bh.	3−3, 7+3, =8	8·2	
,, 28	9704	20	1	La.	=5	8·2	
,, 29	05	40	,,	Hw.	7−2, 12+2	8·6	
,, 30	06	45	,,	Bh.	5−1, 8+1	8·3	
Nov. 1	08	40	,,	Gi.	5−1, 7+1	8·3	
,, 2	09	45	2	Bh.	3−4, 6+4	8·2	
,, 4	11	20	1	La.	7+1, =8	8·4	
,, 7	14	45	2	Bh.	3−2, 6+4	8·1	Very red.
,, 8	15	20	1	La.	7+1, =8	8·4	
,, 11	18	45	,,	Bh.	5−1, 7+1, 8+1	8·3	Ruddy.
,, 11	18	40	2	Hw.	7−1, 12+3	8·5	
,, 12	19	20	1	La.	7+1, =8	8·4	
,, 17	24	45	,,	Bh.	3−4, 5−1, 6+2, 7+1	8·3	
,, 24	31	40	2	Gi.	4−2, 5+1, 7+2	8·2	
,, 25	32	45	,,	Bh.	=5	8·2	Dull red.
,, 25	32	40	1	La.	=7	8·4	
,, 29	36	45	,,	Bh.	5−1, 7+1	8·3	
,, 30	37	40	2	Hw.	7−2, 12+2	8·6	
Dec. 3	40	,,	,,	Gi.	7−1, =8, 12+3	8·5	
,, 3	40	,,	1	La.	7−1, 12+2·5	8·5	
,, 5	42	,,	,,	,,	=7	8·4	
,, 6	43	45	,,	Bh.	=7	8·4	
,, 7	44	40	,,	Gi.	7−2, 12+4	8·5	
,, 7	44	,,	,,	La.	7−2, 12+2	8·6	
,, 8	45	45	2	Bh.	=6, 7−2, =8, 12+2	8·5	
,, 9	46	40	1	La.	7−1, 12+3	8·5	
,, 11	48	,,	,,	,,	7−2·5, 12+1	8·7	
,, 12	49	,,	2	Hw.	7−3, 12+1	8·7	
,, 13	50	45	,,	Bh.	=6, 7−3, =9, 12+1	8·6	
,, 16	53	,,	1	,,	=10, =12, =13	8·8	
,, 17	54	t.75	,,	Bn.	7−3·5, 12+1	8·7	
,, 18	55	T.25	,,	,,	7−3, =11, 12+1	8·8	
,, 20	57	40	2	Gi.	7−4, 12+2	8·7	
,, 23	60	45	,,	Bh.	9−1, =10, =12, 13+1	8·8	
,, 28	9765	90	,,	,,	=17, =19	9·3	

(5601) S URSÆ MINORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Dec. 29	9766	T.50	1	Bn.	17−3, 21+3	9·6	
„ 29	66	120	2	Gh.	=18	9·3	
„ 31	68	40	„	Gi.	12−1·5, 19+2	9·0	
„ 31	68	45	„	Bh.	17−3, =18, =19, 21+3	9·4	
1913.							
Jan. 2	70	„	1	„	12−7, =19, 23+7	9·4	
„ 5	73	„	„	„	13−5, 17−2, 20+2, 22+5	9·4	
„ 5	73	T.50	„	Bn.	17−5·5, 21+2	9·7	
„ 6	74	40	2	La.	21−2, 25+3	10·1	
„ 6	74	„	„	Gi.	12−2, 19+1	9·1	
„ 12	80	„	„	„	=19, 20+2	9·3	
„ 12	80	„	1	La.	=22	10·0	
„ 12	80	90	„	Bh.	20−2, 21+2	9·7	
„ 18	86	„	„	„	17−8, =22, 26+8	10·0	
„ 24	92	40	2	La.	=24	10·2	
„ 25	93	90	1	Bh.	=24, 25+2	10·2	
„ 26	94	T.50	„	Bn.	21−4, 25+2	10·3	
„ 29	97	90	„	Bh.	24−3, =25, 26+3	10·5	
„ 31	9799	„	„	„	=24	10·2	
Feb. 3	9802	„	2	„	24−2, =25, 28+2	10·4	
„ 8	07	„	1	„	29−2·5, =30, 31+5	11·1	
„ 9	08	40	„	La.	25−2, 29+1	10·7	
„ 16	15	90	2	Bh.	29−4·5, 30−2, 31+2, 32+9	11·3	
„ 22	21	„	„	„	=31	11·6	
„ 25	24	40	„	La.	29−3, =30	11·2	
„ 27	26	90	„	Bh.	=30, 31−4, 33+4	11·8	
Mar. 2	29	40	„	La.	30−5, =31, 32+4	11·7	
„ 3	30	90	„	Bh.	=30	11·2	
„ 5	32	40	„	La.	30−5, 32+5	11·7	
„ 11	38	90	„	Bh.	30−5, =31, 32+5	11·7	
„ 20	47	„	„	„	=31	11·6	
„ 25	52	„	1	„	=31	11·6	
„ 30	57	„	„	„	30−5, =31, 32+5	11·7	
„ 30	57	40	2	La.	32+2	12·0	
Apr. 4	62	90	„	Bh.	=30, =31	11·4	
„ 7	65	„	1	„	=30	11·2	
„ 11	69	„	2	„	30−2, 31+2	11·4	
„ 23	81	40	„	La.	30−7, 32+2	12·0	
„ 25	83	90	„	Bh.	=30	11·2	
„ 27	85	„	„	„	=30, =31	11·4	
May 1	89	40	„	La.	29−4, 32+2	11·6	
„ 1	89	60	1	Gh.	=29	10·8	
„ 2	90	90	2	Bh.	29−4, =30, 31+4	11·2	
„ 6	94	T.120	1	Bn.	29−2·5, 30+1	11·1	
„ 7	95	40	„	La.	29−2, 30+2	11·0	
„ 9	97	„	2	„	25−2, 29+2	10·6	Red.
„ 10	98	„	1	Gi.	=29	10·8	
„ 10	9898	60	„	Gh.	=30	11·2	

(5601) S URSÆ MINORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
May 11	9899	90	1	Bh.	=30	11·2	
,, 16	9904	,,	,,	,,	25−4, =29	10·8	
,, 16	04	34	,,	Cr.	=25	10·5	
,, 18	06	40	2	Gi.	=25	10·5	Difficult.
,, 20	08	,,	,,	La.	=25	10·5	Very difficult.
,, 22	10	,,	1	,,	=25	10·5	
,, 25	13	T.120	,,	Bn.	=25	10·5	
,, 25	13	90	2	Bh.	=23, 25+3, 26+5	10·2	
,, 25	13	60	1	Gh.	=25	10·5	
,, 25	13	34	2	Cr.	25+1	10·4	
,, 27	15	40	1	La.	=25	10·5	
,, 27	15	24	,,	Bo.	=25	10·5	
,, 29	17	40	2	Gi.	20−3, 25+3	10·0	Difficult.
,, 30	18	T.50	1	Bn.	21−4, 25+2	10·3	
,, 30	18	40	2	La.	25+1	10·4	
,, 30	18	90	,,	Bh.	=23, 25+3	10·1	
,, 31	19	24	1	Bo.	24−1, 25+1	10·3	
,, 31	19	34	2	Cr.	20−2	9·8	
June 3	22	40	1	La.	=24, 25+3	10·2	
,, 3	22	34	2	Cr.	19−2	9·5	
,, 4	23	24	,,	Bo.	22−1, 24+1	10·1	
,, 4	23	T.50	1	Bn.	16−6·5, 22+1	9·9	
,, 4	23	45	,,	Bh.	12−4, =16, =17, 20+4	9·2	
,, 7	26	T.50	,,	Bn.	16−6·5, 22+2	9·8	
,, 7	26	45	2	Bh.	17−2, =19, 20+2	9·4	Dull red.
,, 7	26	34	1	Cr.	=17	9·2	
,, 8	27	40	2	Gi.	12−3, 19+2	9·1	
,, 8	27	30	,,	Gh.	=22	10·0	
,, 9	28	40	,,	La.	20−2, 22+2	9·8	
,, 14	33	24	1	Bo.	20−1, 21+3	9·6	
,, 14	33	45	2	Bh.	12−2, 17+1	9·1	
,, 15	34	40	,,	La.	20−1, 22+3	9·7	
,, 15	34	34	1	Cr.	12−3	9·1	
,, 16	35	60	2	Gh.	19−7, 26+7	10·1	
,, 19	38	24	1	Bo.	19−1, 20+1	9·4	
,, 21	40	45	,,	Bh.	12−3, 17−1, 19+1	9·2	Very red.
,, 23	42	40	2	La.	20−2, 22+2	9·8	
,, 29	48	T.50	1	Bn.	12−3, 17+1	9·1	
,, 29	48	60	,,	Gh.	19−3, 26+12	9·6	
,, 29	48	34	,,	Cr.	12−1	8·9	
,, 30	49	24	,,	Bo.	20−1, 21+3	9·6	
,, 30	49	45	2	Bh.	17−1, 19+1	9·3	
July 7	56	,,	,,	,,	12−2, =16, 19+2	9·1	
,, 12	61	T.50	1	Bn.	12−1·5, 17+3	8·9	
,, 12	61	40	2	La.	19−3, =20	9·6	Difficult.
,, 19	68	45	1	Bh.	12−3, 16+1, 19+1·5	9·1	
,, 20	69	T.50	,,	Bn.	12−1	8·9	
,, 24	73	,,	,,	,,	17−0·5, =18	9·3	
,, 24	73	15	2	Bo.	19−3, 21+3	9·6	
,, 24	73	79	,,	Ma.	25+6·5	9·8	
,, 25	74	90	,,	Bh.	12−3, 19+1	9·2	
,, 26	75	40	,,	La.	=19	9·3	
,, 28	9977	15	1	Bo.	19−3, 21+3	9·6	

(5601) S URSÆ MINORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
July 29	9978	T.50	1	Bn.	21+1	9·8	
,, 30	79	45	2	Bh.	7−5, 17+2, 19+5	8·9	
,, 31	80	15	1	Bo.	=19	9·3	
,, 31	80	50	,,	Ma.	=22, 25+5	10·0	About.
Aug. 2	82	40	2	La.	=19	9·3	
,, 2	82	45	,,	Bh.	=17, 20+4	9·2	
,, 3	83	50	,,	Ma.	19−6, 25+6	9·9	Difficult.
,, 9	9989	90	1	Bh.	7−5, =12, 19+5	8·8	
,, 20	0000	15	2	Bo.	15−1, 17+1	9·1	
,, 23	03	,,	1	,,	15−1, 17+1	9·1	
,, 24	04	45	,,	Bh.	7−3, =9, 12+1	8·7	
,, 27	07	15	,,	Bo.	15−1, 17+1	9·1	
Sept. 2	13	45	,,	Bh.	7−1, 12+3	8·5	
,, 6	17	90	,,	,,	=7, =8	8·4	
,, 6	17	50	2	Ma.	=12	8·8	
,, 7	18	T.50	1	Bn.	7−1, 12+2·5	8·5	
,, 8	19	t.30	,,	,,	7−2, 9+1, 10+2·5, 12+2	8·6	
,, 8	19	24	,,	Bo.	=12, =13	8·9	
,, 8	19	40	,,	Hw.	12−4, 19+1	9·2	
,, 9	20	45	,,	Bh.	=7	8·4	
,, 11	22	24	,,	Bo.	7−1, 12+2·5	8·5	
,, 15	26	T.25	,,	Bn.	7−0·5, 9+2, 10+3, 12+3	8·5	
,, 20	31	24	,,	Bo.	7−1, 12+2·5	8·5	
,, 20	31	45	,,	Bh.	6+1, =7, 12+3	8·4	
,, 24	35	24	,,	Bo.	7−1, 12+2·5	8·5	
,, 24	35	20	,,	La.	5−1, 7+1	8·3	
,, 24	35	50	,,	Ma.	=7	8·4	
,, 27	38	24	,,	Bo.	7−1, 12+3	8·5	
,, 27	38	45	,,	Bh.	6+3, 7+2	8·2	
,, 28	39	50	,,	Ma.	7−3, 12+1	8·7	
,, 30	41	,,	,,	,,	12+1	8·7	
,, 30	41	24	2	Bo.	7−2, 12+2	8·6	
,, 30	41	40	1	Hw.	7−3, 12+1	8·7	
Oct. 4	45	24	2	Bo.	7−1, 12+3	8·5	
,, 4	45	90	1	Bh.	6+3, 7+2	8·2	
,, 9	50	79	,,	Ma.	7−1, 12+3	8·5	
,, 12	53	24	2	Bo.	7−3, 12+1	8·7	
,, 13	54	90	1	Bh.	6+3, 7+2	8·2	
,, 16	57	,,	2	,,	6−1, 7−2	8·6	
,, 21	62	40	1	La.	7−1, 12+3	8·5	
,, 22	63	90	2	Bh.	=6, 7−1	8·5	
,, 22	63	40	,,	Hw.	12−1, 19+4	8·9	
,, 24	65	24	,,	Bo.	7−3, 12+1	8·7	
,, 25	66	,,	,,	,,	7−2, 12+2	8·6	
,, 25	66	40	1	La.	5−1, 7+1	8·3	
,, 30	71	90	,,	Bh.	=6, 7−1	8·5	
,, 31	72	40	,,	La.	7−2, 12+2	8·6	
Nov. 1	73	24	,,	Bo.	7−2, 12+2	8·6	
,, 1	73	90	2	Hw.	7−4·5, 12−1	8·9	
,, 3	0075	,,	,,	Bh.	7−2, 12+2	8·6	

(5601) S URSÆ MINORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Nov. 7	0079	24	2	Bo.	12−2, 17+2	9·0	
,, 7	79	79	1	Ma.	12−11, 25+5·5	9·9	
,, 8	80	90	2	Bh.	7−2, 12+2	8·6	
,, 14	86	24	,,	Bo.	12−2, 17+2	9·0	
,, 17	89	90	1	Bh.	7−5, =12, 19+5	8·8	
,, 18	90	40	,,	La.	12−3, =19	9·2	
,, 19	91	24	2	Bo.	17−1, 19+1	9·3	
,, 22	94	T.50	1	Bn.	=12	8·8	
,, 24	0096	45	2	Bh.	12−2, 13−2, 17+2, 19+2	9·1	
,, 28	0100	90	1	Bh.	12−2, 19+2	9·1	
,, 28	00	40	,,	La.	20−2, 22+1	9·8	
Dec. 1	03	,,	2	,,	20−4, 22+2, 25+8	9·8	
,, 1	03	45	,,	Bh.	12−5, =19, 21+5	9·3	
,, 10	12	40	1	La.	24−1, 25+3	10·2	
,, 12	14	90	2	Bh.	=19	9·3	
,, 14	16	T.95	1	Bn.	25+2	10·3	
,, 16	18	40	2	La.	=24, 25+3	10·2	
,, 16	18	90	,,	Bh.	=16, =17, =18, =19	9·3	
,, 17	19	70	,,	Bo.	20−5, 25+5	10·0	
,, 21	23	90	,,	Bh.	19−2	9·5	
,, 25	27	40	,,	La.	25−2, 29+1	10·7	
,, 31	33	T.120	,,	Bn.	29−1, 30+2·5	10·9	
1914.							
Jan. 3	36	,,	1	,,	=30	11·2	
,, 6	39	45	2	Bh.	23−2, 25+2	10·3	
,, 18	51	90	1	,,	=30	11·2	
,, 25	58	,,	,,	,,	30−5, =31, 32+5	11·7	
,, 25	58	40	,,	La.	29−6, 32+2	11·7	
,, 26	59	T.120	,,	Bn.	=31	11·6	
,, 30	63	90	2	Bh.	30−5, =31, 32+5	11·7	
Feb. 2	66	,,	,,	,,	31−3, 32+3	11·9	
,, 5	69	40	1	La.	31−4, =32	12·1	
,, 15	79	150	,,	Bh.	30−6, 31−3, 32+3, 33+6	11·9	
,, 17	81	70	2	Bo.	32−1, 33+1	12·4	
,, 17	81	40	1	La.	32−2	12·4	
,, 18	82	T.120	,,	Bn.	32−2, 33+1	12·4	
,, 21	85	150	2	Bh.	29−9, 32+4·5	11·7	
,, 23	87	70	,,	Bo.	32−1, 33+1	12·4	
,, 26	90	T.120	1	Bn.	33−2	12·7	
Mar. 2	94	90	,,	Bh.	31−2, 32+4	11·8	
,, 2	0194	75	,,	La.	32−2, 33+2	12·4	
,, 9	0201	,,	2	,,	29−6, 32+4	11·6	
,, 11	03	90	,,	Bh.	=31	11·6	
,, 18	10	75	1	La.	29−10, =32	12·0	
,, 22	14	T.120	,,	Bn.	32−1, 33+2	12·3	
,, 28	20	70	,,	Bo.	31−3, 32+3	11·9	
,, 31	0223	T.120	,,	Bn.	32−2, 33+1	12·4	

(5601) S URSÆ MINORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Apr. 3	0226	150	2	Bh.	30−2, =31	11·5	
,, 6	29	90	1	,,	29−5, =30, 32+8	11·3	
,, 10	33	,,	,,	,,	29−2, 30+2	11·0	
,, 12	35	79	,,	Ma.	25−2	10·7	
,, 13	36	40	2	La.	29−5, 30−4, 32+5	11·5	
,, 14	37	90	1	Bh.	25−2·5, 29+1	10·7	
,, 18	41	79	,,	Ma.	25−2, 29−1	10·8	
,, 18	41	24	,,	Bo.	=30	11·2	
,, 18	41	120	2	Gh.	=31	11·6	
,, 22	45	40	1	La.	25−4, 29+2	10·7	Very difficult.
,, 23	46	79	,,	Ma.	25−1	10·6	
,, 23	46	40	3	Hw.	=29	10·8	
,, 25	48	79	1	Ma.	25−1	10·6	
,, 25	48	T.120	,,	Bn.	30−2, 31+1	11·5	
,, 25	48	60	,,	Gh.	=29	10·8	
,, 27	50	79	,,	Ma.	=25	10·5	
,, 28	51	40	2	La.	25−4, =29	10·8	
,, 28	51	T.120	1	Bn.	29−2, 30+1	11·1	
May 2	55	24	,,	Bo.	=25	10·5	
,, 2	55	60	,,	Cr.	25−1	10·6	
,, 2	55	90	,,	Bh.	25−1·5, 29+2	10·6	
,, 6	59	40	,,	La.	25−3, 29+6	10·5	
,, 9	62	90	2	Bh.	21−4, 22−1, 24+1, 28+4	10·2	
,, 15	68	60	1	Gh.	=25	10·5	
,, 16	69	,,	,,	,,	=24	10·2	
,, 16	69	34	2	Cr.	25+3	10·2	
,, 16	69	T.50	1	Bn.	21+1	9·8	
,, 20	73	40	2	La.	25+3	10·2	
,, 21	74	T.50	1	Bn.	=21	9·9	
,, 21	74	30	,,	Gh.	=24	10·2	
,, 23	76	40	,,	La.	=22, 25+3	10·1	
,, 25	78	90	,,	Bh.	=19	9·3	
,, 28	81	24	2	Bo.	20−4, 23+1	10·0	
June 3	87	90	1	Bh.	=19	9·3	
,, 9	93	40	,,	La.	20−1, 22+5	9·6	
,, 15	0299	90	,,	Bh.	19+1	9·2	
,, 16	0300	40	,,	La.	19−2, =20, 22+4	9·6	
,, 18	02	24	2	Bo.	=20	9·6	
,, 22	06	40	1	La.	19−2, 20+1	9·5	
,, 22	06	45	2	Bh.	=19	9·3	
,, 26	10	70	,,	Bo.	19−0·5, 20+2	9·4	
,, 29	13	40	1	La.	19−3, =20	9·6	
,, 29	13	90	,,	Bh.	12−3, 19+2	9·1	
,, 29	13	T.50	,,	Bn.	=17, =18	9·3	
July 3	17	45	,,	Bh.	12−1·5, 19+3	9·0	
,, 4	18	T.50	,,	Bn.	10−0·5, =11	8·9	
,, 8	22	90	,,	Bh.	12−1·5, 19+3	9·0	
,, 9	23	15	2	Bo.	13−3, 19+1·5	9·2	
,, 9	23	50	1	Ma.	12−1	8·9	
,, 13	27	40	2	La.	12−5, =19, 20+2	9·3	
,, 15	29	50	1	Ma.	12−1	8·9	
,, 17	0331	T.50	,,	Bn.	7−1, =9	8·6	

(5601) S URSÆ MINORIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
July 18	0332	90	2	Bh.	7−1, 12+2·5	8·5	
,, 19	33	40	,,	La.	12−3, =19, 20+3	9·2	
,, 23	37	79	,,	Ma.	12−2	9·0	Red.
,, 25	39	,,	1	,,	12−2	9·0	
,, 28	42	40	,,	La.	6−5, =12	8·9	
,, 28	42	90	,,	Bh.	7−2, 12+2	8·6	
Aug. 2	47	79	,,	Ma.	12−0·5	8·9	Red.
,, 5	50	90	,,	Bh.	7−1, 12+2·5	8·5	
,, 11	56	40	,,	La.	7−2·5, 12+1	8·7	
,, 12	57	90	,,	Bh.	7−2, 12+1·5	8·6	
,, 14	59	T.50	,,	Bn.	7−3, 12+1	8·7	
,, 21	66	90	,,	Bh.	7−2·5, 12+1	8·7	
,, 25	70	40	2	La.	12−2, 19+2	9·1	
,, 26	71	45	1	Bh.	7−2, 12+2	8·6	
,, 26	71	T.50	,,	Bn.	7−3, 12+1	8·7	
,, 28	73	T.25	,,	,,	7−3, 9+1, 12+1	8·6	
Sept. 1	77	,,	,,	,,	7−1, =9	8·6	
,, 4	80	90	,,	Bh.	7−2, 12+2·5	8·6	
,, 6	82	T.25	,,	Bn.	9+1	8·5	
,, 12	88	40	,,	La.	12−2, 19+2	9·1	
,, 15	91	90	,,	Bh.	7−2·5, 12+1	8·7	
,, 20	96	,,	2	,,	7−2, 12+2	8·6	
,, 23	0399	40	,,	Hw.	12−4, 20+4	9·2	
,, 24	0400	T.50	1	Bn.	7−1, =9	8·6	
,, 25	01	90	,,	Bh.	7−2·5, 12+1	8·7	
,, 29	05	40	,,	La.	6−5, 7−4, =12	8·9	
Oct. 9	15	,,	,,	,,	6−5, 12−1, 19+3	9·0	
,, 10	16	45	,,	Bh.	12−1·5, 19+3	9·0	
,, 27	33	90	,,	,,	12−3, 19+1·5	9·1	
Nov. 3	40	,,	,,	,,	=19	9·3	
,, 9	46	40	,,	La.	20−5, =22	10·0	
,, 14	51	90	,,	Bh.	=21, 25+3	10·0	
,, 14	51	T.50	,,	Bn.	12−13, 26+6·5	10·1	
,, 20	57	90	,,	Bh.	=20, =21	9·7	
,, 25	62	,,	3	Hw.	=25	10·5	
,, 28	65	40	2	La.	25−2, =26, 29+3	10·7	
,, 28	65	90	1	Bh.	=25, 29+2	10·5	
Dec. 5	72	,,	3	Hw.	=29	10·8	
,, 7	74	150	2	Bh.	=25	10·5	
,, 14	81	90	,,	,,	25−6, =29, 32+12	11·0	
,, 15	82	40	1	La.	25−6, 29−2, =30	11·1	
,, 23	90	90	2	Bh.	29−4, =30, 31+4	11·2	
,, 29	0496	,,	,,	,,	30−2, 31+2	11·4	

(5677) R SERPENTIS. (V. 1.)

H.D. 154615.

NOTES.

Star C = D.M. + 16° 2840, 6·14 m. P.D.M.
,, F = υ Serpentis 5·74 m. ,,
,, N = ϕ ,, 5·74 m. ,,
,, P = ψ ,, 5·87 m. ,,

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Mar. 3	8734	160	2	Br.	=19	12·1	
,, 10	41	,,	,,	,,	15−4, 19+4	11·7	
,, 20	51	,,	1	,,	12−2, 13+1	10·8	
,, 31	62	45	,,	,,	9−2, 10+1	10·2	
Apr. 1	63	T.50	,,	Bn.	9−2, 10+0·5	10·2	
,, 17	79	t.60	,,	,,	5−6, 7+2	9·0	
,, 25	87	45	,,	Br.	3−5, 5+5	7·9	
,, 27	89	60	,,	Gh.	3−6, 5+4	8·0	
,, 29	91	p.16	,,	Bn.	3−7, 5+2	8·2	p.=2″ O.G.
May 2	94	T.120	,,	,,	3−6, 5+4	8·0	
,, 7	99	t.30	,,	,,	3−1	7·5	
,, 7	99	45	,,	Br.	3+1	7·3	
,, 7	8799	50	,,	Ma.	=3	7·4	
,, 9	8801	60	,,	Gh.	=4	7·5	
,, 12	04	t.30	,,	Bn.	=3	7·4	
,, 14	06	,,	,,	,,	3+1	7·3	
,, 15	07	,,	,,	,,	3+1·5	7·3	In B. 7·3.
,, 15	07	50	,,	Ma.	3+0·5, 4+1	7·4	
,, 16	08	,,	2	,,	4+1	7·4	
,, 18	10	60	1	Br.	3+3	7·1	
,, 23	15	t.30	,,	Bn.	3+3	7·1	
,, 26	18	,,	,,	,,	3+4	7·0	
,, 27	19	60	,,	Br.	=2, 3+5	6·9	
,, 31	23	,,	2	Gh.	=2	6·8	
,, 31	23	t.30	,,	Bn.	3+5	6·9	
June 3	26	B.	1	,,	C−6, 3+6	6·8	
,, 3	26	50	,,	Ma.	3+2·5	7·2	
,, 8	31	t.30	,,	Bn.	3+4	7·0	
,, 13	36	B.	,,	Br.	2−1, 3+5	6·9	
,, 13	36	50	,,	Ma.	3+2, 4+1	7·3	
,, 14	37	t.30	,,	Bn.	3+3	7·1	
,, 15	38	T.25	,,	,,	3+3	7·1	
,, 17	40	50	,,	Ma.	3+3, 4+3	7·2	
,, 18	41	60	2	Gh.	=2	6·8	
,, 18	41	T.25	1	Bn.	3+2	7·2	
,, 19	42	t.30	,,	,,	3+3	7·1	
,, 22	45	50	,,	Ma.	3+2	7·2	
,, 24	47	,,	2	,,	3−2	7·6	
,, 26	49	,,	1	,,	=3	7·4	
,, 28	8851	T.25	,,	Bn.	3+1·5	7·3	

(5677) R SERPENTIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
July 3	8856	t.30	1	Bn.	3−0·5, =4	7·5	
„ 3	56	60	„	Br.	=3	7·4	
„ 4	57	50	2	Ma.	3+1·5	7·3	
„ 11	64	„	1	„	3−3	7·7	
„ 11	64	t.30	„	Bn.	3−3, 5+6·5	7·8	
„ 13	66	„	„	„	3−7, 5+2	8·2	
„ 22	75	„	„	„	3−7, 5+2	8·2	
„ 22	75	50	2	Ma.	3−6, 5+3	8·1	
„ 25	78	„	„	„	3−8, 5+2	8·2	
„ 25	78	T.25	1	Bn.	3−7, 5+2	8·2	
„ 31	84	t.30	„	„	3−8·5, 5+1	8·3	
„ 31	84	60	„	Br.	5+1	8·3	
„ 31	84	„	„	Gh.	=5	8·4	
Aug. 2	86	50	2	Ma.	5−3, 7+6	8·7	
„ 6	90	„	„	„	5−7, 7+1	9·1	
„ 6	90	t.60	1	Bn.	5−5·5, 7+3	9·0	
„ 6	90	60	„	Gh.	5−2, 7+6·5	8·6	
„ 8	92	45	„	Br.	5−1, 7+5	8·6	
„ 10	94	t.60	„	Bn.	5−6, 7+2	9·0	
„ 10	8894	„	„	Gh.	5−2, 7+6·5	8·6	
„ 19	8903	„	„	„	5−6·5, 7+2	9·1	
„ 24	08	„	2	„	=7	9·3	
„ 25	09	p.16	1	Bn.	5−7, 7+1·5	9·1	p.=2″ O.G.
„ 31	15	45	„	Br.	7−3, 9+5	9·5	
Sept. 1	16	t.60	„	Bn.	5−8, 7+0·5	9·2	
„ 8	23	„	„	„	9−0·5, 10+2	10·1	
„ 12	27	„	„	„	9−1, 10+1·5	10·1	
„ 16	31	45	„	Br.	=10	10·3	
Oct. 2	47	T.50	„	Bn.	10−1	10·4	
„ 9	54	160	„	Br.	13−2, 15+2	11·1	
Nov. 1	77	T.50	„	Bn.	<17	<11·6	Not seen.
„ 9	85	160	2	Br.	<19	<12·1	Perhaps glimpsed.
„ 11	87	240	1	„	22−2, 24+6	12·8	
„ 21	8997	160	2	„	<21	<12·4	Glimpsed.
Dec. 27	9033	t.75	1	Bn.	<19	<12·1	Not seen.
1911.							
Jan. 31	9068	T.50	„	„	17−8, 22+1	12·4	
Mar. 4	9100	„	„	„	15−1, 17+1	11·5	
„ 4	00	160	„	Br.	13−6, 19+6	11·5	
„ 9	05	T.50	„	Bn.	13−4, 15+0·5	11·3	
„ 25	21	„	„	„	13−3, 15+1·5	11·2	
Apr. 3	30	„	„	„	=9	10·0	
„ 3	30	160	„	Br.	7−4, 9+4	9·6	
„ 15	42	t.30	„	Bn.	4−7, 5+2	8·2	
„ 19	46	45	„	Br.	=3	7·4	
„ 20	9147	t.30	„	Bn.	4−3, 5+6	7·8	

(5677) R SERPENTIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
Apr. 23	9150	t.30	I	Bn.	=3, 4+0·5	7·4	
„ 29	56	45	„	Br.	3+5	6·9	
May 2	59	T.25	„	Bn.	3+2	7·2	In B. 7·2.
„ 4	61	t.30	„	„	3+2, 4+2·5	7·2	
„ 8	65	T.25	„	„	3+1, 4+1·5	7·3	
„ 14	71	t.30	„	„	3+1, 4+1·5	7·3	
„ 15	72	45	„	Br.	2−2, 3+4	7·0	
„ 21	78	t.30	„	Bn.	3+1, 4+1·5	7·3	
„ 24	81	„	„	„	3+1·5, 4+2	7·3	
„ 27	84	„	„	„	3+2, 4+2·5	7·2	
„ 28	85	B.	„	Br.	C−3, 2+3	6·5	
„ 29	86	t.30	„	Bn.	3+2	7·2	
„ 29	86	10	2	Cr.	3+2	7·2	
June 1	89	„	I	„	3+2	7·2	
„ 1	89	t.30	„	Bn.	3+2, 4+2·5	7·2	
„ 4	92	30	„	Gh.	=2	6·8	
„ 6	94	t.30	„	Bn.	3+1·5, 4+2	7·3	
„ 8	9196	34	„	Cr.	3+2	7·2	
„ 18	9206	45	„	Br.	3+4	7·0	
„ 18	06	30	„	Gh.	=4	7·5	
„ 20	08	34	„	Cr.	=3	7·4	
„ 21	09	T.25	2	Bn.	=3, =4	7·5	
„ 27	15	t.30	I	„	4−0·5	7·5	
„ 28	16	30	„	Gh.	=4	7·5	
July 1	19	34	„	Cr.	5+3	8·1	
„ 2	20	t.30	„	Bn.	4−0·5	7·5	
„ 4	22	T.50	„	„	3−1	7·5	
„ 10	28	„	„	„	3−8·5, 5+1	8·3	
„ 12	30	30	„	Gh.	3−8, 5+2	8·2	
„ 15	33	T.50	„	Bn.	3−8, 5+1	8·3	
„ 18	36	30	„	Gh.	=5	8·4	
„ 21	39	T.50	„	Bn.	5+1	8·3	
„ 21	39	60	„	Br.	5+1	8·3	
„ 27	45	30	„	Gh.	5−3, 7+5	8·7	
„ 27	45	34	„	Cr.	5−2, 6+2	8·6	
„ 27	45	T.50	„	Bn.	5−1, 7+7	8·5	
„ 31	49	„	„	„	5−3, 7+6	8·7	
Aug. 1	50	45	„	Br.	5−5, 7+3	8·9	
„ 3	52	60	„	Gh.	=7	9·3	
„ 13	62	„	„	„	=7	9·3	
„ 18	67	45	„	Br.	7−3, 9+4	9·6	
„ 25	74	30	„	Gh.	7−4, 10+6	9·7	
Sept. 1	81	45	„	Br.	9+2	9·8	
„ 4	84	34	„	Cr.	=10	10·3	
„ 11	91	60	„	Gh.	=10	10·3	
„ 17	9297	160	„	Br.	9−1, 10+1	10·2	
„ 24	9304	60	„	Gh.	=13	10·9	
„ 26	06	T.95	„	Bn.	13−3·5, 15+1	11·3	
Oct. 10	9320	60	2	Gh.	<15	<11·3	

(5677) R SERPENTIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
Nov. 8	9349	160	2	Br.	<19	<12·1	Not seen.
,, 20	9361	,,	,,	,,	<20	<12·2	Glimpsed.
Dec. 30	9401	,,	1	,,	24−1	13·5	
1912.							
Mar. 6	68	,,	,,	,,	13−1·5, 15+3	11·1	
,, 19	9481	45	2	,,	7−5, 9+3	9·7	
Apr. 13	9506	,,	1	,,	3−5, 5+5	7·9	
,, 20	13	30	,,	Gh.	=3, =4	7·5	
,, 26	19	38	2	Gd.	3+2	7·2	
,, 29	22	T.50	1	Bn.	=4	7·5	
May 2	25	,,	,,	,,	3+1, 4+1	7·4	
,, 8	31	,,	2	,,	3+2·5	7·2	
,, 13	36	B.	1	Ma.	=4	7·5	
,, 14	37	,,	2	Ga.	C−3, 2+3	6·5	
,, 16	39	45	1	Br.	2−2, 3+5	7·0	
,, 17	40	B.	2	Ga.	C−3, 2+3	6·5	
,, 18	41	,,	1	Ma.	3+1, 4+0·5	7·4	
,, 19	42	,,	,,	,,	3+1·5, 4+1	7·3	
,, 24	47	30	2	Gh.	=2	6·8	
,, 24	47	B.	,,	Ga.	2+1	6·7	About.
,, 24	47	T.50	1	Bn.	3+2	7·2	
June 2	56	T.25	,,	,,	3+1·5, 4+2	7·3	
,, 5	59	,,	,,	,,	3+2, 4+2·5	7·2	
,, 6	60	45	,,	Br.	3+6	6·8	
,, 8	62	T.25	,,	Bn.	3+2, 4+2·5	7·2	
,, 9	63	B.	2	Ga.	C−6, =2, 3+6	6·8	
,, 10	64	t.30	1	Bn.	3+2, 4+2·5	7·2	
,, 10	64	30	,,	Gh.	2−5, 4+1·5	7·3	
,, 20	74	,,	,,	,,	3−2, 5+8	7·6	
,, 21	75	T.50	,,	Bn.	3+1, 4+1	7·4	
,, 22	76	60	2	Ga.	2−3, 3+3	7·1	
,, 23	77	,,	1	Br.	3+4	7·0	
,, 23	77	T.50	,,	Bn.	3+0·5, 4+1	7·4	
,, 28	82	,,	,,	,,	3−1	7·5	Reddish.
July 4	88	,,	,,	,,	3−3, 5+6	7·8	
,, 8	92	,,	,,	,,	3−5, 5+5	7·9	
,, 11	95	,,	,,	,,	3−7, 5+2	8·2	
,, 11	95	60	,,	Ga.	3−3, 5+6	7·8	
,, 14	98	T.50	,,	Bn.	3−8, 5+2	8·2	
,, 15	9599	,,	,,	,,	3−8, 5+2	8·2	
,, 18	9602	45	,,	Br.	3−5, 5+5	7·9	
,, 30	14	T.50	,,	Bn.	3−8·5, 5+1	8·3	
Aug. 30	45	t.75	,,	,,	7−7, 10+2	10·0	
Sept. 2	48	T.50	,,	,,	7−5, 9+2	9·8	
,, 2	48	45	,,	Br.	7−3, 9+5	9·5	
,, 18	9664	60	,,	,,	10−2, 13+4	10·5	

(5677) R SERPENTIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Sept. 20	9666	T.95	I	Bn.	10−1	10·4	
,, 22	68	,,	,,	,,	10−2	10·5	
Oct. 2	78	T.50	,,	,,	=13	10·9	
,, 7	83	41	,,	Gd.	=12	10·7	
,, 10	9686	160	2	Br.	=19	12·1	About. Doubtful.
,, 29	9705	,,	I	,,	=19, =20	12·2	
Dec. 29	9766	T.50	,,	Bn.	<17	<11·6	Doubtfully seen.
1913.							
Feb. 1	9800	T.120	,,	,,	15−1·5, 17+1	11·5	
,, 26	25	160	2	Br.	13−2, 15+2	11·1	
Mar. 11	38	,,	I	,,	9+1	9·9	
,, 11	38	62	,,	Th.	=9	10·0	
,, 17	44	160	,,	Br.	=7	9·3	
,, 30	57	45	,,	,,	3−6, 5+4	8·0	
,, 30	57	T.50	,,	Bn.	3−6, 5+4	8·0	
Apr. 4	62	37	,,	Th.	3−1, 5+9	7·5	
,, 12	70	,,	2	,,	2−1·5, 3+5	6·9	
,, 12	70	p.16	I	Bn.	3+4	7·0	p.=2″ O.G.
,, 16	74	F.	,,	Th.	C−6, =2, 3+6	6·8	
,, 19	77	37	,,	,,	2+2·5	6·5	In F. 6·5.
,, 23	81	50	,,	Ma.	4+3	7·2	Pale red.
,, 23	81	45	2	Bh.	=3, =4	7·5	
,, 24	82	t.22	I	Bl.	C−1·5, 2+5	6·3	
,, 27	85	45	,,	Br.	2−2, 3+5	7·0	
,, 28	86	,,	,,	Bh.	3+1	7·3	
,, 28	86	37	2	Th.	=2	6·8	
May 1	89	T.50	I	Bn.	3+3, 4+3·5	7·1	
,, 1	89	30	,,	Gh.	2−3, 3+3	7·1	
,, 1	89	B.	2	Ma.	3+4	7·0	
,, 1	89	37	I	Th.	2−1	6·9	
,, 2	90	,,	,,	,,	2+1	6·7	In F. 6·8.
,, 2	90	B.	2	Ma.	3+3	7·1	Pale red.
,, 2	90	45	,,	Bh.	=3, =4	7·5	
,, 3	91	t.22	I	Bl.	C−2, 2+4	6·4	
,, 4	92	45	,,	Bh.	2−5, 3+2	7·3	
,, 6	94	T.50	,,	Bn.	3+3	7·1	
,, 6	94	50	,,	Ma.	3+4	7·0	In B. 6·9.
,, 9	97	B.	,,	,,	3+3·5	7·1	
,, 9	97	45	,,	Br.	3+4	7·0	
,, 10	98	T.50	,,	Bn.	3+2	7·2	
,, 10	98	30	,,	Gh.	=2	6·8	
,, 11	99	45	,,	Bh.	3+3, 4+5	7·1	
,, 11	9899	50	,,	Ma.	3+2·5	7·2	
,, 13	9901	T.50	,,	Bn.	3+2	7·2	
,, 14	02	45	2	Bh.	3+5, 4+5	7·0	
,, 14	02	t.22	I	Bl.	C−2·5, 2+4	6·4	
,, 15	03	62	2	Th.	3+2·5	7·2	In F. 7·1.
,, 16	04	T.50	I	Bn.	3+1·5	7·3	
,, 16	9904	45	,,	Bh.	2−1, 3+5	6·9	

(5677) R SERPENTIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
May 16	9904	10	1	Cr.	C−4, 2+2	6·6	
,, 16	04	30	2	Gh.	=3	7·4	
,, 16	04	50	,,	Ma.	3+2, 4+1	7·3	
,, 16	04	37	,,	Th.	=2	6·8	
,, 21	09	45	,,	Bh.	3+2, 4+2	7·3	
,, 21	09	37	1	Th.	3+2	7·2	In F. 7·3.
,, 23	11	34	,,	Cr.	3+2	7·2	
,, 24	12	T.50	,,	Bn.	3+1	7·3	
,, 24	12	50	,,	Ma.	3+1, =4	7·4	Reddish.
,, 25	13	45	,,	Br.	3+2	7·2	
,, 25	13	34	,,	Cr.	3+3	7·1	
,, 25	13	30	,,	Gh.	=3	7·4	
,, 25	13	50	,,	Ma.	3+1, =4	7·4	
,, 25	13	37	,,	Th.	=4	7·5	
,, 25	13	t.22	,,	Bl.	C−6, 2+1	6·7	
,, 30	18	45	,,	Bh.	3+3, 4+3	7·2	
,, 30	18	30	,,	Gh.	=3	7·4	
,, 30	18	37	,,	Th.	3+1	7·3	
,, 31	19	T.50	,,	Bn.	3−2	7·6	
,, 31	19	34	,,	Cr.	=3	7·4	
,, 31	19	50	,,	Ma.	=3, 4−1	7·5	
June 2	21	34	,,	Cr.	3+2	7·2	
,, 2	21	50	,,	Ma.	=3, 4−1	7·5	Orange.
,, 3	22	T.50	,,	Bn.	=3	7·4	
,, 3	22	62	,,	Th.	=3	7·4	
,, 7	26	45	,,	Br.	3+2	7·2	
,, 7	26	T.50	,,	Bn.	3−2	7·6	
,, 7	26	45	,,	Bh.	3+1, 4+1	7·4	
,, 7	26	34	,,	Cr.	3−2	7·6	
,, 7	26	50	,,	Ma.	=3, 4−1·5	7·5	
,, 8	27	30	,,	Gh.	3−4, 5+6	7·8	
,, 10	29	50	,,	Ma.	3−1, 4−2	7·6	Reddish.
,, 12	31	t.22	,,	Bl.	=4	7·5	
,, 15	34	34	,,	Cr.	3−2	7·6	
,, 15	34	50	2	Ma.	3−3, 4−4	7·8	
,, 16	35	T.25	1	Bn.	3−3, 5+6	7·8	
,, 16	35	60	,,	Gh.	3−6, 5+4	8·0	
,, 21	40	45	2	Bh.	3−2	7·6	
,, 23	42	50	1	Ma.	3−3, 5+6	7·8	
,, 25	44	t.22	,,	Bl.	4−8, 5+1	8·3	
,, 27	46	T.50	,,	Bn.	3−7, 5+2	8·2	
,, 27	46	50	,,	Ma.	4−8, 5+1·5	8·3	
,, 27	46	90	2	Bh.	3−6, 5+3	8·1	
,, 29	48	34	1	Cr.	5+3	8·1	
,, 29	48	30	,,	Gh.	=5	8·4	
July 1	50	45	,,	Bh.	3−7, 5+2·5	8·1	
,, 3	52	T.50	,,	Bn.	=5	8·4	
,, 8	57	62	2	Th.	5−2, 6+1	8·7	
,, 8	57	t.22	1	Bl.	=5	8·4	
,, 11	60	50	,,	Ma.	5+1	8·3	Reddish.
,, 13	62	T.50	,,	Bn.	5−2, 7+6·5	8·6	
,, 13	62	50	,,	Ma.	5−1	8·5	
,, 19	68	45	,,	Bh.	5−2, 6+2	8·6	
,, 20	9969	T.50	,,	Bn.	5−7, 7+1·5	9·1	

(5677) R SERPENTIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
July 22	9971	37	2	Th.	5−6, 7+2	9·0	
,, 23	72	t.22	1	Bl.	5−6, 7+2	9·0	
,, 24	73	50	,,	Ma.	7+2	9·1	
,, 25	74	45	,,	Bh.	7+1	9·2	
,, 29	78	62	2	Th.	7−2	9·5	
,, 29	78	T.50	1	Bn.	5−7, 7+1	9·1	
,, 30	79	45	,,	Bh.	7−3, 9+6	9·5	
,, 30	79	t.22	,,	Bl.	5−6, 7+3	9·0	
,, 31	80	50	,,	Ma.	=7	9·3	
Aug. 1	81	,,	,,	,,	7−2, 10+8	9·5	
,, 2	82	45	,,	Br.	7−2, 9+5	9·5	
,, 2	82	,,	2	Bh.	7−5, 9+5	9·6	
,, 2	82	34	,,	Cr.	=7	9·3	
,, 2	82	62	,,	Th.	7−4, 10+6	9·7	
,, 3	83	50	1	Ma.	7−5, 10+5	9·8	
,, 5	85	,,	2	,,	7−2, 10+8	9·5	
,, 6	86	T.94	1	Bl.	5−7, 7+1	9·1	
,, 16	9996	45	,,	Bh.	7−6, 9+2, 10+3	9·9	
,, 24	0004	,,	,,	Br.	=10	10·3	
,, 27	07	90	,,	Bh.	=9, =10	10·2	
Sept. 2	13	45	,,	,,	=12, 13+3	10·6	
,, 3	14	79	,,	Ma.	10−0·5	10·3	
,, 5	16	60	,,	Tn.	10−2, 12+2	10·5	
,, 6	17	T.95	,,	Bn.	13−1·5, 15+3	11·1	
,, 7	18	155	2	Th.	15+2	11·1	
,, 8	19	50	,,	Ma.	13+1	10·8	
,, 8	19	T.94	1	Bl.	12−1·5, =13	10·9	
,, 9	20	45	,,	Br.	13−2, 15+2	11·1	
,, 9	20	60	,,	Tn.	=13	10·9	
,, 9	20	90	2	Bh.	12−1, 13+2	10·7	
,, 14	25	155	,,	Th.	15+2	11·1	
,, 20	31	90	1	Bh.	13−4, =15, 17+2	11·3	
,, 21	32	60	,,	Tn.	13−3·5, 15+1	11·3	
,, 21	32	160	2	Br.	=15	11·3	About.
,, 27	38	90	1	Bh.	=16, =17	11·5	
Oct. 1	42	45	2	,,	=18, 20+1	12·0	
,, 6	47	60	1	Tn.	17−1·5, 19+4	11·7	
,, 7	48	,,	,,	,,	=18	12·0	
,, 17	58	90	,,	Bh.	19−3, 20−2	12·4	
,, 19	60	160	2	Br.	20−1, 21+1	12·3	
,, 22	63	60	,,	Tn.	=21	12·4	
Nov. 8	80	150	,,	Bh.	20−5, 22−3	12·8	
,, 22	94	120	,,	,,	=23	13·3	M.
,, 24	0096	160	,,	Br.	19−4	12·5	About.
,, 28	0100	150	,,	Bh.	22−5, 23+2	13·1	Glimpsed.
Dec. 9	11	90	,,	,,	22−2	12·8	
,, 12	14	,,	,,	,,	=22	12·6	
,, 23	25	,,	,,	,,	=15, =16	11·3	
,, 29	31	,,	,,	,,	=15, =16, =17	11·4	
,, 31	0133	,,	1	,,	=15, 16+2, 17+2	11·3	

(5677) R SERPENTIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Jan. 5	0138	90	2	Bh.	=13, 12−4, 17+4	11·1	
„ 6	39	T.50	1	Bn.	13−3, 15+1·5	11·2	
„ 14	47	T.94	„	Bl.	9−1, 12+5	10·2	
„ 18	51	45	2	Bh.	7−4, 9+4	9·6	
„ 25	58	90	1	„	6−4, =7, 8+4	9·3	
„ 29	62	45	„	„	7+1	9·2	
Feb. 4	68	T.50	„	Bn.	7−5, 9+2	9·8	
„ 5	69	45	„	Bh.	5−7, 7+2	9·1	
„ 10	74	T.94	„	Bl.	5−7, 7+1	9·1	In t.22, 9·1.
„ 15	79	45	„	Bh.	5−6, 7+3	9·0	
„ 22	86	60	2	Ga.	5−4, 7+4	8·8	
„ 26	90	45	1	Bh.	=5	8·4	
„ 28	92	T.50	„	Bn.	5+1	8·3	
Mar. 7	0199	45	„	Bh.	=3	7·4	
„ 12	0204	„	„	„	2−1, 3+5	6·9	
„ 16	08	B.	„	Br.	C−2, 2+4	6·4	
„ 16	08	„	„	Ga.	C−3, 3+9	6·5	
„ 17	09	t.22	„	Bl.	C−1, 2+6	6·2	
„ 18	10	45	„	Bh.	2+1, 3+7	6·7	
„ 18	10	B.	„	Ga.	=C	6·1	
„ 21	13	„	„	Bn.	C+1	6·0	
„ 21	13	45	2	Bh.	3+10	6·4	In B. 6·9.
„ 21	13	B.	1	Ga.	F−2, =C	6·0	
„ 22	14	„	„	Br.	C+1	6·0	
„ 22	14	„	„	Ga.	F−3, C+1	6·0	
„ 22	14	F.	„	Tm.	=F, =N	5·7	
„ 27	19	B.	2	Br.	F−2, C+2	5·9	
„ 27	19	„	1	Bn.	C+1	6·0	
„ 27	19	„	„	Ga.	F−2, C+2	5·9	
„ 28	20	t.22	„	Bl.	=F	5·7	
„ 29	21	45	„	Bh.	C−3, 3+10	6·4	
Apr. 1	24	„	„	„	F−2, C+2	5·9	
„ 2	25	B.	„	Ga.	N−2, C+1	6·0	
„ 4	27	„	„	„	N−2, C+2	5·9	
„ 5	28	„	„	Bh.	F−2, C+2	5·9	
„ 7	30	„	„	Ga.	F−1, N−1	5·8	
„ 10	33	45	„	Bh.	=F	5·7	
„ 11	34	B.	„	Ga.	F−1, C+1	5·9	
„ 12	35	„	„	Bn.	C+1	6·0	
„ 12	35	45	„	Bh.	=F, =N	5·7	
„ 12	35	t.22	„	Bl.	N−0·5, C+3	5·8	
„ 14	37	B.	„	Ga.	F−2, C+2	5·9	
„ 14	37	„	„	Ma.	C+2	5·9	
„ 15	38	„	„	Br.	F−2, C+2	5·9	
„ 15	38	„	„	Bn.	C+2	5·9	
„ 16	39	„	„	Ga.	F−2, C+2	5·9	
„ 16	39	45	„	Bh.	F−1, C+2	5·9	
„ 17	40	B.	„	Ga.	F−2, =C	6·0	
„ 18	41	„	„	Ma.	C+1	6·0	
„ 19	42	„	„	Br.	F−3, C+1	6·0	
„ 19	42	45	„	Bh.	F−1, C+2	5·9	
„ 20	43	B.	„	Ga.	F−2, C+2	5·9	Reddish.
„ 20	0243	t.22	„	Bl.	N−2, C+1	6·0	

(5677) R SERPENTIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Apr. 21	0244	B.	I	Ga.	F−3, =C	6·1	
„ 22	45	„	„	Bn.	C+1	6·0	
„ 23	46	45	„	Bh.	F−2, C+2	5·9	
„ 23	46	B.	2	Ma.	C+2	5·9	
„ 25	48	„	I	Br.	=C	6·1	
„ 25	48	„	„	Bn.	C+1·5	6·0	
„ 25	48	„	„	Ma.	=C	6·1	
„ 25	48	„	„	Ga.	F−3, =C	6·1	
„ 25	48	F.	„	Tn.	=C	6·1	
„ 25	48	40	„	Bc.	=P	5·9	
„ 26	49	45	„	Bh.	F−3, C+1	6·0	
„ 26	49	t.22	„	Bl.	N−1, C+3	5·8	
„ 27	50	F.	„	Tn.	C+2	5·9	
„ 28	51	B.	„	Ma.	=C	6·1	
„ 28	51	„	„	Ga.	F−4, C−1	6·2	
„ 28	51	F.	2	Tm.	=F, =N	5·7	
„ 30	53	45	I	Bh.	=C	6·1	
May 2	55	B.	„	Br.	C−0·5	6·2	
„ 2	55	„	„	Bh.	=F, C−2	6·0	
„ 2	55	„	„	Ga.	F−4, =C, 2+5	6·2	
„ 2	55	t.22	„	Bl.	N−2, C+1	6·0	
„ 3	56	40	„	Bc.	P−4	6·3	
„ 4	57	B.	„	Ga.	F−4, C−1, 2+4	6·3	
„ 7	60	40	„	Bc.	P−4	6·3	
„ 8	61	t.22	„	Bl.	N−3, C+1	6·0	
„ 10	63	B.	„	Bh.	C−2, 3+10	6·4	
„ 10	63	„	2	Ga.	C−2, 2+4	6·4	
„ 11	64	F.	„	Tn.	C−2·5, 3+10	6·4	
„ 12	65	t.22	I	Bl.	N−3, C+0·5	6·1	
„ 13	66	B.	2	Br.	C−6, 3+6	6·8	
„ 14	67	„	I	Ga.	C−3, 2+3	6·5	
„ 15	68	T.50	„	Bn.	3+3	7·1	In B. 7·2.
„ 15	68	30	„	Gh.	=2	6·8	
„ 15	68	F.	„	Tn.	C−4, 3+9	6·5	
„ 16	69	45	„	Br.	3+6	6·8	
„ 16	69	10	„	Cr.	C−4, 2+2	6·6	
„ 17	70	B.	„	Ga.	C−3, 2+2	6·5	
„ 18	71	45	„	Bh.	C−3, 3+9	6·5	
„ 18	71	t.22	„	Bl.	C−2, 2+4	6·4	
„ 21	74	T.50	„	Bn.	3+3	7·1	In B. 7·1.
„ 21	74	30	„	Gh.	=2	6·8	
„ 25	78	T.50	„	Bn.	3+2	7·2	
„ 25	78	45	„	Bh.	C−5, 3+10	6·5	
„ 25	78	B.	„	Ga.	=2, 3+3	7·0	
„ 26	79	45	„	Br.	3+4	7·0	
„ 26	79	24	2	Wa.	2−3, 3+3	7·1	
„ 26	79	80	„	Tm.	C−10, 3+3	7·1	
„ 30	83	t.22	I	Bl.	C−5, 2+1	6·7	
„ 31	84	45	„	Bh.	3+3	7·1	
June 2	86	B.	2	Ga.	2−3, 3+1	7·2	
„ 3	87	45	„	Bh.	=3	7·4	
„ 5	89	t.22	I	Bl.	=3	7·4	
„ 7	91	60	„	Ga.	3−1, =4	7·5	Yellowish.
„ 9	0293	80	2	Tm.	3−2, 5+8	7·6	

(5677) R SERPENTIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
June 10	0294	60	1	Th.	3−1	7·5	
,, 10	94	45	,,	Bh.	3+3	7·1	
,, 10	94	60	,,	Ga.	3−2, 4−1	7·6	
,, 10	94	40	,,	Bc.	3+2	7·2	
,, 10	94	t.22	,,	Bl.	2−5, 3+2	7·3	
,, 13	97	40	,,	Th.	=3	7·4	
,, 13	97	45	,,	Bh.	=3	7·4	
,, 14	98	,,	,,	Br.	3−1	7·5	
,, 14	0298	T.50	,,	Bn.	3−3, 5+6	7·8	
,, 17	0301	24	2	Wa.	3−5, 5+5	7·9	
,, 19	03	45	1	Bh.	3−2	7·6	
,, 19	03	t.22	,,	Bl.	4−5, 5+5	7·9	
,, 22	06	60	,,	Ga.	3−5, 5+3	8·0	
,, 23	07	T.50	,,	Bn.	3−6·5, 5+3	8·1	
,, 23	07	30	,,	Tn.	3−3, 5+7	7·7	
,, 25	09	45	,,	Bh.	3−6, 5+4	8·0	
,, 26	10	40	,,	Th.	3−5, 5+5	7·9	
,, 27	11	45	,,	Br.	3−6, 5+3	8·1	
,, 27	11	60	,,	Ga.	5+1, =(6+8)	8·4	
,, 27	11	t.22	2	Bl.	4−6, 5+4	8·0	
,, 27	11	50	1	Ma.	3−7, 5+2	8·2	Ruddy.
,, 29	13	60	,,	Th.	3−3	7·7	
,, 29	13	90	,,	Bh.	3−8, 5+2	8·2	
,, 29	13	60	,,	Ga.	=5, =(6+8)	8·5	
,, 30	14	T.50	,,	Bn.	3−8, 5+2	8·2	
July 2	16	40	,,	Bc.	5+2	8·2	
,, 3	17	30	,,	Tn.	3−7, 5+3	8·1	
,, 3	17	24	,,	Wa.	=5	8·4	
,, 4	18	T.50	,,	Bn.	5+1	8·3	
,, 4	18	60	,,	Ga.	5−1, =(6+8)	8·5	
,, 7	21	,,	2	,,	5−2, (6+8)−1	8·6	
,, 8	22	45	1	Bh.	=5	8·4	
,, 8	22	40	,,	Bc.	=5	8·4	
,, 9	23	T.50	,,	Bn.	=5	8·4	
,, 9	23	30	,,	Tn.	3−9, 5+1	8·3	
,, 9	23	50	,,	Ma.	5−5, 7+3·5	8·9	
,, 12	26	,,	,,	,,	5−7, 7+2	9·1	
,, 14	28	T.50	,,	Bn.	5−2	8·6	
,, 14	28	40	,,	Bc.	=5	8·4	
,, 15	29	24	,,	Wa.	5−4, =6, 7+4	8·8	
,, 17	31	T.50	,,	Bn.	5−3, 7+5·5	8·7	
,, 18	32	90	,,	Bh.	5−3, 7+5·5	8·7	
,, 19	33	60	,,	Ga.	5−5, 7+1	9·0	
,, 21	35	24	,,	Wa.	6−2, 7+2	9·1	
,, 23	37	50	,,	Ma.	5−6, 7+2	9·0	Pale red.
,, 28	42	90	,,	Bh.	5−6, 7+3	9·0	
,, 28	42	80	,,	Tm.	5−3, 7+6	8·7	
,, 29	43	T.50	,,	Bn.	5−7, 7+1	9·1	
,, 30	44	80	2	Tm.	=7	9·3	
Aug. 2	47	50	,,	Ma.	7−1, 10+9	9·4	
,, 3	48	45	1	Br.	6−3, 7+1	9·2	
,, 3	48	60	,,	Ga.	7−2	9·5	
,, 4	49	,,	,,	Th.	7−4, 10+6	9·7	
,, 5	0350	90	,,	Bh.	=7	9·3	

(5677) R SERPENTIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Aug. 13	0358	60	1	Ga.	10+2	10·1	
„ 14	59	T.95	„	Bn.	7−8, 10+2	10·1	
„ 14	59	90	„	Bh.	7−2, =8, 10+7	9·6	
„ 14	59	120	„	Ga.	=9, =10	10·2	
„ 16	61	60	„	„	10+1, 12+3	10·3	
„ 17	62	„	„	Tn.	=10	10·3	
„ 21	66	90	„	Bh.	10−2, 12+2	10·5	
„ 21	66	45	„	Br.	9−1, 10+1	10·2	
„ 23	68	60	„	Ga.	10−1	10·4	
„ 24	69	„	2	Th.	13−1	11·0	
„ 26	71	T.50	1	Bn.	10−2, 12+1	10·5	
„ 26	71	60	„	Tn.	=12	10·7	
„ 30	75	T.95	„	Bn.	13−1, 15+3	11·0	
Sept. 1	77	90	„	Bh.	=12	10·7	
„ 2	78	40	„	Bc.	12−1	10·8	
„ 5	81	60	2	Tn.	=15	11·3	
„ 6	82	90	1	Bh.	12−2, =13	10·9	
„ 9	85	40	„	Bc.	15+1, 16+1	11·2	
„ 10	86	160	„	Br.	15−1, 17+1	11·5	
„ 10	86	T.95	„	Bn.	15−1·5, 17+1	11·5	
„ 11	87	80	3	Tm.	=17	11·6	Glimpsed.
„ 11	87	60	1	Tn.	=17	11·6	
„ 15	91	90	„	Bh.	=15, =16, 17−2	11·5	
„ 17	93	T.95	„	Bn.	17−2, 19+2	11·8	
„ 20	96	114	2	Th.	20+2	12·0	
„ 23	99	160	1	Br.	17−4, 19+2	11·9	
„ 23	0399	90	2	Bh.	16−3, 17−1, 18+3	11·7	
„ 29	0405	„	1	„	15−2, 16−3, =17	11·6	
Oct. 11	17	„	„	„	20−0·5	12·3	
Nov. 3	40	„	2	„	20−5	12·7	
„ 12	49	120	1	Br.	<19	<12·1	Not seen.
„ 19	56	90	„	Bh.	21−5, 22−5	13·0	
„ 26	63	150	„	„	23−1	13·4	Glimpsed.
Dec. 1	68	„	„	„	=23	13·3	„
„ 18	85	90	„	„	22−2	12·8	
„ 21	88	150	2	„	=22	12·6	About.
„ 23	90	„	„	„	21−3, 22−2, 23+4	12·8	Red.
„ 25	92	T.94	„	Bl.	=21	12·4	Difficult.
„ 31	0498	90	„	Bh.	15−2, 16−2, =17	11·5	

(5955) R DRACONIS. (V. 1.)

H.D. 163266.

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Jan. 10	8682	160	I	Br.	18−3, 19+1	10·9	
" 10	82	t.120	"	Bn.	=18	10·6	
" 10	82	T.94	"	Ni.	17−4, 19+1	10·9	
" 17	89	"	"	"	17−3, 19+2	10·8	
" 19	91	t.85	"	Bn.	18−2, 19+1	10·8	
" 20	92	160	"	Br.	=18	10·6	
" 26	8698	T.95	"	Bn.	16−2, 18+2	10·4	
" 30	8702	t.60	"	"	14−2·5, 16+1	10·1	
" 30	02	T.94	"	Ni.	13−4, 16+1·5	10·0	In t.22, 10·3.
Feb. 4	07	T.50	"	Bn.	12−2, 14+2	9·6	
" 8	11	t.60	"	"	12−2, 14+1	9·7	
" 9	12	T.50	"	"	12−2, 14+1	9·7	
" 9	12	T.94	"	Ni.	9+1·5	8·9	
" 11	14	T.50	"	Bn.	12−2, 14+2	9·6	
" 15	18	t.60	"	"	9−1, 12+1	9·2	
" 18	21	160	"	Br.	4−2, 9+6	8·5	
" 18	21	t.22	"	Ni.	4−3, 9+4·5	8·6	
" 23	26	t.30	"	Bn.	3−1·5, 4+1	8·2	
" 24	27	t.22	"	Ni.	3−1·5, 4+1	8·2	In T.94, 7·9. Whitish yellow.
Mar. 3	34	60	2	Br.	2−2, 4+6	7·7	
" 5	36	t.22	I	Ni.	1−4·5, 2+1	7·3	
" 10	41	45	"	Br.	1−3, 2+3	7·2	
" 15	46	"	"	"	1−2, 2+4	7·1	
" 16	47	T.25	"	Bn.	1−1, 2+4	7·0	
" 16	47	t.22	"	Ni.	1−2, 2+3·5	7·1	Yellowish white.
" 26	57	"	"	"	1−3, 2+1	7·3	" "
" 27	58	t.30	"	Bn.	1−2, 2+3·5	7·1	
" 29	60	"	"	"	1−4, 2+1·5	7·3	
" 29	60	50	"	Ma.	2−1·5	7·6	
" 31	62	45	"	Br.	=2	7·4	
Apr. 1	63	t.30	"	Bn.	1−4·5, 2+1	7·3	
" 2	64	"	"	"	=2	7·4	
" 7	69	"	2	"	1−4·5, 2+1	7·3	
" 13	75	t.22	I	Ni.	=2	7·4	Yellow.
" 15	77	t.30	"	Bn.	2−2, 3+4	7·6	
" 26	88	50	"	Ma.	4+4	7·9	
" 26	88	t.22	"	Ni.	3−1, 4+1	8·2	
May 2	94	45	"	Br.	4+2	8·1	
" 5	97	t.22	"	Ni.	4−2, 9+5	8·5	In T.94, 8·3. Yellowish white.
" 7	99	t.30	"	Bn.	4−1, 6+2	8·4	
" 7	8799	50	"	Ma.	4−5, 9+2·5	8·8	
" 12	8804	t.22	"	Ni.	4−4·5, 9+3	8·7	
" 13	05	t.30	"	Bn.	4−2, 6+0·5	8·5	
" 14	06	"	"	"	4−2, 6+0·5	8·5	
" 15	8807	50	"	Ma.	4−2, 12+9·5	8·5	

(5955) R DRACONIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
May 16	8808	50	1	Ma.	9−1	9·2	
,, 18	10	160	,,	Br.	4−4, 9+4	8·7	
,, 26	18	t.30	,,	Bn.	6−4·5, 9+1	9·0	
,, 29	21	160	,,	Br.	12−2, 16+6	9·6	
June 2	25	T.94	,,	Ni.	=16	10·2	
,, 3	26	50	,,	Ma.	=16	10·2	
,, 8	31	t.60	2	Bn.	=14	9·8	
,, 9	32	T.94	1	Ni.	16−1, 17+2	10·3	
,, 13	36	160	,,	Br.	16−2, 18+2	10·4	
,, 14	37	t.60	,,	Bn.	16−2, 18+1	10·4	
July 7	60	T.94	,,	Ni.	=22, 27+3	11·7	
,, 11	64	160	,,	Br.	22−2, 27+2	11·8	
,, 11	64	183	,,	Ma.	27+1·5	11·9	
,, 16	69	T.94	,,	Ni.	22−2, 27+1·5	11·8	
,, 22	75	183	2	Ma.	=27	12·0	
,, 29	82	T.94	1	Ni.	27−2, 32+3	12·2	
,, 31	84	160	,,	Br.	22−3, 27+1	11·9	
,, 31	84	183	,,	Ma.	27−2	12·2	
Aug. 7	91	,,	,,	,,	27−5	12·5	Glimpsed.
,, 9	93	T.94	,,	Ni.	27−3, 32+2	12·3	
,, 10	94	160	2	Br.	22−3, 27+1	11·9	
,, 10	94	183	1	Ma.	27−2·5	12·3	
,, 12	96	,,	,,	,,	27−3·5	12·4	
,, 15	8899	,,	,,	,,	27−3	12·3	
,, 22	8906	160	2	Br.	27−2, 32+3	12·2	
,, 26	10	183	1	Ma.	27−4	12·4	
,, 29	13	T.94	,,	Ni.	27−2, 32+3	12·2	
,, 31	15	160	,,	Br.	27−2, 32+3	12·2	
Sept. 3	18	79	,,	Ma.	20−6, 27+1·5	11·9	
,, 8	23	160	2	Br.	=27	12·0	
,, 11	26	183	,,	Ma.	=20	11·3	About.
,, 12	27	t.85	,,	Bn.	=20	11·3	,,
,, 17	32	160	1	Br.	20−1, 22+3	11·3	
,, 20	35	T.120	,,	Bn.	19−1·5, 20+1	11·1	
,, 21	36	T.94	,,	Ni.	19−2, 20+1	11·2	
,, 25	40	,,	2	,,	=19	11·0	
,, 29	44	T.120	1	Bn.	18−2, 19+1	10·8	
Oct. 3	48	t.120	,,	,,	18−3, =19	10·9	
,, 6	51	t.85	,,	,,	18+1	10·5	
,, 6	51	T.94	,,	Ni.	=17	10·5	
,, 14	59	,,	,,	,,	13−3, 16+3	9·9	In t.22, 10·2.
,, 14	59	160	,,	Br.	12−4, 16+3	9·8	
,, 22	67	t.60	2	Bn.	9−1, 12+2·5	9·2	
,, 22	67	T.94	1	Ni.	4−5·5, 9+2	8·8	In t.22, 9·1.
Nov. 1	77	t.30	,,	Bn.	2−5, 3+1	7·9	
,, 4	80	,,	,,	,,	2−5, =3	8·0	
,, 5	81	t.22	,,	Ni.	2−4, 3+1	7·9	Whitish yellow.
,, 6	82	45	,,	Br.	2−6, 4+3	8·0	
,, 11	87	t.30	,,	Bn.	2−3, 3+3	7·7	
,, 14	8990	t.22	,,	Ni.	2−2·5, 3+3	7·7	Whitish yellow.

(5955) R DRACONIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Nov. 15	8991	45	1	Br.	2−2, 3+4, 4+6	7·6	
„ 16	92	t.30	„	Bn.	2−5, 3+1	7·9	
„ 20	8996	„	„	„	2−4, 3+2	7·8	
„ 25	9001	t.22	„	Ni.	2−2·5, 3+3	7·7	Whitish yellow.
„ 28	04	t.30	„	Bn.	2−4, 3+2	7·8	
„ 29	05	45	„	Br.	2−4, 4+4	7·9	
Dec. 5	11	„	„	„	2−4, 4+4	7·9	
„ 9	15	t.22	„	Ni.	2−3, 3+3	7·7	Whitish yellow.
„ 19	25	„	„	„	3+1	7·9	
„ 19	25	160	„	Br.	4+2	8·1	
„ 19	25	t.30	„	Bn.	2−5, 3+1	7·9	
„ 24	30	„	„	„	2−5, =3	8·0	
„ 27	33	„	„	„	=3	8·0	
„ 29	35	„	„	„	3−0·5, 4+2	8·1	
„ 30	36	t.22	„	Ni.	4+1	8·2	In T.94, 8·3. Whitish yellow.
1911.							
Jan. 1	38	t.30	„	Bn.	3−1·5, 4+1	8·2	
„ 1	38	160	„	Br.	=4	8·3	
„ 7	44	t.30	„	Bn.	=4	8·3	
„ 9	46	„	„	„	4−2, 6+1	8·5	
„ 12	49	t.22	„	Ni.	4−6, 9+2	8·9	
„ 23	60	160	„	Br.	12−3, 16+5	9·7	
„ 29	66	T.94	„	Ni.	9−4, 13+1	9·5	
„ 31	68	t.60	„	Bn.	14−2, 16+1	10·0	
Feb. 9	77	T.94	„	Ni.	17−1·5, 19+3	10·6	
„ 19	87	„	„	„	19−1, 20+1	11·1	
„ 22	90	160	2	Br.	=20	11·3	
„ 25	93	T.120	1	Bn.	20−1, 22+2·5	11·4	
„ 26	9094	T.94	„	Ni.	=20	11·3	
Mar. 4	9100	160	„	Br.	20−1, 22+3	11·3	
„ 5	01	T.94	„	Ni.	22−2, 27+2	11·8	
„ 9	05	T.120	„	Bn.	=22	11·6	
„ 19	15	T.94	„	Ni.	27−2, 32+3	12·2	
„ 21	17	T.120	„	Bn.	27−1, 32+4	12·1	
„ 29	25	T.94	2	Ni.	27−2, 32+3	12·2	
Apr. 3	30	T.120	1	Bn.	27−3, 32+1	12·4	
„ 3	30	160	„	Br.	27−2, 32+2	12·3	
„ 15	42	T.94	„	Ni.	=32	12·5	
„ 19	46	160	„	Br.	27−2, 32+3	12·2	
„ 20	47	T.94	„	Ni.	32−0·5, 34+3	12·6	
„ 29	56	160	„	Br.	22−3, 27+1	11·9	
May 2	59	T.120	„	Bn.	27−3, 32+1	12·4	
„ 4	61	T.94	„	Ni.	=32	12·5	
„ 16	73	160	„	Br.	=22	11·6	
„ 21	78	T.94	2	Ni.	=22	11·6	Doubtful.
„ 22	79	T.120	1	Bn.	20−2, =22	11·5	
„ 27	84	„	„	„	19−2, 20+0·5	11·2	
„ 28	85	T.94	„	Ni.	18−3, 19+1	10·9	
„ 28	9185	160	„	Br.	19−1, 20+1	11·1	

(5955) R DRACONIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
June 1	9189	T.120	1	Bn.	18−3, 19+1	10·9	
„ 4	92	T.94	„	Ni.	17−3, 19+2	10·8	
„ 7	9195	T.120	„	Bn.	18−3, 19+1	10·9	
„ 18	9206	T.94	„	Ni.	16+3	9·9	
„ 19	07	160	„	Br.	12−5, 16+3	9·9	
„ 27	15	t.60	„	Bn.	9−2·5, 12+1	9·3	
July 3	21	t.22	„	Ni.	=4	8·3	
„ 5	23	t.30	„	Bn.	4−0·5, 6+2	8·3	
„ 10	28	„	„	„	3−0·5, 4+2	8·1	
„ 10	28	t.22	„	Ni.	2−5, 3+0·5	8·0	
„ 18	36	t.30	„	Bn.	2−5, 3+1	7·9	
„ 19	37	t.22	„	Ni.	2−2, 3+3·5	7·7	Yellowish white.
„ 21	39	60	„	Br.	2−3, 4+6	7·7	
„ 21	39	t.30	„	Bn.	2−4, 3+2	7·8	
„ 27	45	„	„	„	2−1, 3+4	7·6	
„ 30	48	„	„	„	2−2, 3+4	7·6	
„ 30	48	t.22	„	Ni.	2−2, 3+4	7·6	
„ 31	49	t.30	„	Bn.	2−3, 3+3	7·7	
Aug. 1	50	45	„	Br.	2−3, 4+6	7·7	
„ 8	57	t.22	„	Ni.	2−3, 3+3	7·7	Whitish yellow.
„ 24	73	„	„	„	2−4, 3+2	7·8	
„ 24	73	160	„	Br.	4+2	8·1	
Sept. 6	86	„	„	„	=4	8·3	
„ 14	9294	60	„	„	4−4, 9+4	8·7	
„ 21	9301	t.22	„	Ni.	9+0·5	9·0	
„ 28	08	„	„	„	9−3·5, 13+2	9·4	
Oct. 1	11	T.50	„	Bn.	12−4, 16+4	9·8	
„ 10	20	160	„	Br.	=16	10·2	
„ 11	21	T.94	„	Ni.	13−3, 16+3	9·9	
„ 18	28	„	„	„	17−3, 19+2	10·8	
„ 25	35	T.120	„	Bn.	18−3, 19+1	10·9	
„ 26	36	T.94	„	Ni.	17−4, 19+1	10·9	
„ 27	37	160	„	Br.	=19	11·0	
„ 28	38	T.120	„	Bn.	19−0·5, 20+2	11·0	
Nov. 5	46	T.94	„	Ni.	19−1, 20+2	11·1	
„ 14	55	160	2	Br.	22−1, 27+3	11·7	
„ 15	56	T.120	1	Bn.	=22	11·6	
„ 21	62	T.94	„	Ni.	22−2, 27+3	11·8	
„ 29	70	T.120	„	Bn.	22−3, 27+1·5	11·9	
Dec. 4	75	240	„	Br.	22−3, 27+1	11·9	
„ 9	80	T.120	„	Bn.	22−3, 27+1·5	11·9	
„ 9	80	T.94	„	Ni.	20−2, 22+1·5	11·5	
„ 15	86	„	2	„	22−1·5, 24+2	11·7	
„ 15	86	160	1	Br.	=22	11·6	
„ 20	9391	T.120	„	Bn.	22−1·5, 27+3	11·7	
„ 30	9401	T.94	„	Ni.	20−1, 22+3	11·3	

(5955) R DRACONIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Jan. 7	9409	T.94	1	Ni.	19−2, 20+0·5	11·2	
„ 7	09	160	„	Br.	20+1	11·2	
„ 17	19	T.94	„	Ni.	17−2, 19+2	10·7	
„ 26	28	T.50	„	Bn.	12−3, 14+1·5	9·7	
„ 27	29	T.94	„	Ni.	9−5, 13+1	9·5	
Feb. 1	34	160	„	Br.	9−1, 12+3	9·1	
„ 2	35	t.22	„	Ni.	9−1·5	9·2	
„ 10	43	„	„	„	4−6, 9+2	8·9	
„ 21	54	„	„	„	=4	8·3	
Mar. 3	65	T.25	„	Bn.	2−1, 3+5	7·5	
„ 6	68	45	„	Br.	2+1	7·3	
„ 7	69	t.22	„	Ni.	2+1	7·3	
„ 19	81	„	„	„	=1	6·9	
„ 20	82	45	„	Br.	1−4, 2+2	7·3	
„ 29	91	t.22	„	Ni.	1+1	6·8	
Apr. 3	96	T.50	„	Bn.	1−4, 2+1·5	7·3	
„ 4	97	20	2	La.	=b	7·2	
„ 6	9499	„	„	„	=b	7·2	
„ 9	9502	t.22	1	Ni.	1−2, 2+3	7·1	
„ 10	03	20	2	La.	=2	7·4	
„ 16	09	45	1	Br.	2−1	7·5	
„ 21	14	t.22	„	Ni.	2−2, 3+4	7·6	
„ 22	15	20	2	La.	=d	7·7	
„ 25	18	„	1	„	d−1, 3+2	7·8	
„ 27	20	t.22	„	Ni.	2−2·5, 3+3	7·7	
„ 29	22	38	„	Gd.	4+5	7·8	
„ 29	22	t.30	„	Bn.	2−4, 3+1	7·9	
May 3	26	t.22	„	Ni.	=3, 4+2	8·1	
„ 6	29	20	„	La.	3−1, 4+1	8·2	
„ 9	32	„	„	„	3−1, 4+2	8·1	
„ 11	34	„	„	„	=4	8·3	
„ 13	36	t.22	„	Ni.	4−5, 9+2·5	8·8	
„ 18	41	160	„	Br.	=9	9·1	
„ 20	43	t.22	„	Ni.	4−7, 9+0·5	9·0	
„ 25	48	40	„	La.	9−1, 12+2	9·2	
June 2	56	„	„	„	12−3, 14+1	9·7	
„ 2	56	T.50	„	Bn.	=14	9·8	
„ 6	60	160	„	Br.	12−4, 16+4	9·8	
„ 7	61	T.94	„	Ni.	=16	10·2	
„ 10	64	T.95	„	Bn.	16−2, 18+1	10·4	
„ 18	72	T.94	„	Ni.	17−3, 19+2	10·8	
„ 22	76	T.120	„	Bn.	18−3, 19+1	10·9	
July 9	93	T.94	2	Ni.	22−2, 27+2	11·8	
„ 11	95	T.120	1	Bn.	19−4, 22+1	11·4	
„ 12	9596	T.94	„	Ni.	22−1·5, 27+3	11·7	
„ 24	9608	„	2	„	22−3, 27+1·5	11·9	
Aug. 2	17	160	„	Br.	22−3	11·9	Glimpsed.
„ 5	9620	T.94	„	Ni.	=27	12·0	

(5955) R DRACONIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Aug. 14	9629	T.94	1	Ni.	27−1·5, 32+3	12·2	
„ 20	35	„	„	„	27−3, 32+3	12·3	
Sept. 2	48	160	„	Br.	22−3, 27+2	11·9	
„ 2	48	T.150	„	Bn.	27−3	12·3	
„ 5	51	T.94	„	Ni.	=27	12·0	
„ 12	58	„	„	„	22−3·5, 27+1	11·9	
„ 15	61	„	„	„	22−2, 27+2	11·8	
„ 18	64	160	„	Br.	27−1, 32+4	12·1	
„ 20	66	T.120	„	Bn.	22−3, 27+1	11·9	
„ 27	73	T.94	„	Ni.	20−2, 22+2	11·4	
Oct. 2	78	T.120	„	Bn.	19−1, 20+1	11·1	
„ 3	79	T.94	„	Ni.	19−2, 20+1	11·2	
„ 5	81	T.120	„	Bn.	19+1	10·9	
„ 8	84	41	„	Gd.	=18	10·6	
„ 9	85	T.50	„	Bn.	18−2, 19+1	10·8	
„ 9	85	T.94	„	Ni.	17−4, 19+1	10·9	
„ 10	86	160	„	Br.	18−3, 19+1	10·9	
„ 10	86	T.120	„	Bn.	18−2, 19+1	10·8	
„ 13	89	40	2	La.	=17	10·5	Difficult.
„ 14	90	T.95	1	Bn.	16−3, 18+1	10·5	
„ 15	91	40	2	La.	=16	10·2	Difficult.
„ 20	96	„	„	„	16+2	10·0	„
„ 22	9698	„	„	Hw.	9−6, 12−3	9·7	
„ 26	9702	„	1	La.	9−2, 12+1	9·3	Difficult.
„ 27	03	T.94	„	Ni.	4−7, 9+1	9·0	
„ 28	04	40	„	La.	=9	9·1	
„ 29	05	45	„	Br.	4−5, 9+3	8·8	
Nov. 1	08	T.50	„	Bn.	4−1, 6+2	8·4	
„ 3	10	t.30	„	„	4−1, 6+2	8·4	
„ 3	10	T.94	„	Ni.	4+0·5	8·2	In t.22, 8·4.
„ 7	14	20	„	La.	=4	8·3	
„ 9	16	„	„	„	=3	8·0	
„ 11	18	45	„	Br.	4+3	8·0	
„ 12	19	20	„	La.	d−2, 3+1	7·9	
„ 13	20	t.30	„	Bn.	2−6·5, 4+2	8·1	
„ 25	32	20	„	La.	d−1, 3+2	7·8	
„ 27	34	T.25	„	Bn.	2−4, 3+1	7·9	
„ 30	37	„	„	„	2−5, 3+1	7·9	
Dec. 2	39	t.22	„	Ni.	3−1, 4+2	8·1	
„ 3	40	20	„	La.	=3	8·0	
„ 4	41	160	„	Br.	4+3	8·0	
„ 5	42	20	„	La.	d−1, 3+2	7·8	
„ 7	44	„	„	„	=3	8·0	
„ 9	46	„	„	„	3−1, 4+1	8·2	
„ 12	49	t.30	„	Bn.	2−5, 3+1	7·9	
„ 12	49	t.22	„	Ni.	3−1, 4+1	8·2	
„ 18	55	„	„	„	4−1	8·4	In T.94, 8·2.
„ 18	55	T.25	„	Bn.	3−0·5, 4+2	8·1	
„ 23	60	160	„	Br.	4−1	8·4	
„ 29	66	T.50	„	Bn.	4−2, 6+0·5	8·5	
„ 30	9767	t.22	„	Ni.	=9	9·1	

(5955) R DRACONIS—*continued.*

Date.		Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.								
Jan.	1	9769	t.30	1	Bn.	6−3·5, 9+2	8·9	
,,	2	70	45	,,	Br.	4−5, 9+3	8·8	
,,	9	77	T.94	,,	Ni.	9−3·5, 13+2	9·4	In t.22, 9·3.
,,	12	80	t.60	,,	Bn.	12−1, 14+3	9·5	
,,	12	80	40	,,	La.	12−1, 14+2·5	9·5	
,,	25	93	T.94	,,	Ni.	13−4·5, 16+1	10·1	
,,	26	94	160	,,	Br.	16−2, 18+2	10·4	
,,	26	9794	T.120	,,	Bn.	18−1, 19+2	10·7	
Feb.	5	9804	T.94	,,	Ni.	19−1, 20+2	11·1	
,,	8	07	T.120	,,	Bn.	19−1, 20+1	11·1	
,,	9	08	40	2	La.	=19	11·0	
,,	15	14	T.94	1	Ni.	=20	11·3	
,,	25	24	160	,,	Br.	20−1, 22+3	11·3	
,,	25	24	T.94	,,	Ni.	20−2, 22+1	11·5	
Mar.	8	35	,,	,,	,,	22−3, 27+0·5	11·9	
,,	8	35	T.120	,,	Bn.	20−2, =22	11·5	
,,	11	38	160	,,	Br.	22−3, 27+2	11·9	
,,	23	50	T.94	,,	Ni.	27−2, 32+2	12·3	
,,	30	57	160	,,	Br.	=27	12·0	
,,	31	58	183	,,	Ma.	27−1	12·1	
Apr.	7	65	T.94	,,	Ni.	27−3, 32+1	12·4	
,,	23	81	183	,,	Ma.	27−2	12·2	
,,	25	83	160	,,	Br.	=27	12·0	
,,	25	83	T.94	,,	Ni.	=32	12·5	
May	1	89	183	,,	Ma.	27−0·5	12·1	
,,	2	90	,,	,,	,,	27−2	12·2	
,,	6	94	T.120	,,	Bn.	22−3, 27+1·5	11·9	
,,	6	94	183	,,	Ma.	27+1·5	11·9	
,,	9	97	160	,,	Br.	20−3, 22+1	11·5	
,,	10	98	T.120	,,	Bn.	22−1·5, 27+3	11·7	
,,	11	9899	T.94	,,	Ni.	22−1, 27+3	11·7	
,,	13	9901	T.120	,,	Bn.	=22	11·6	
,,	13	01	79	,,	Ma.	20−2, 22+2	11·4	
,,	15	03	T.94	,,	Ni.	=22	11·6	
,,	16	04	79	,,	Ma.	20−1	11·4	
,,	22	10	40	2	La.	=19	11·0	
,,	24	12	79	1	Ma.	18−1·5, 19+3	10·7	
,,	25	13	160	,,	Br.	16−2, 18+2	10·4	
,,	25	13	T.120	,,	Bn.	18−2, 19+1	10·8	
,,	26	14	24	,,	Bo.	16−2, 17+2	10·3	
,,	26	14	79	,,	Ma.	16−3, =18	10·5	
,,	26	14	T.94	,,	Ni.	17−2, 19+2·5	10·7	
,,	27	15	40	,,	La.	18−1, 19+3	10·7	
,,	28	16	24	,,	Bo.	16−2, 17+2	10·3	
,,	30	18	T.95	,,	Bn.	=16	10·2	
,,	30	18	40	,,	La.	14−2, 16+2	10·0	
,,	31	19	50	,,	Ma.	16−3, 18+1·5	10·4	
June	2	21	24	,,	Bo.	16−0·5, 17+3	10·2	
,,	2	21	40	,,	La.	9−3, =12, 14+4	9·4	
,,	3	22	T.50	,,	Bn.	12−2, 14+1·5	9·6	
,,	6	9925	40	,,	La.	9−4, 12−1, 14+3	9·5	

(5955) R DRACONIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
June 7	9926	160	1	Br.	12−5, 16+3	9·9	
,, 7	26	T.50	,,	Bn.	12−3, 14+1·5	9·7	
,, 8	27	T.94	,,	Ni.	=13	9·6	In t.22, 9·9.
,, 10	29	40	,,	La.	9−3, =12	9·4	
,, 14	33	24	,,	Bo.	=12, 13+1	9·5	
,, 15	34	t.22	,,	Ni.	9−4, 13+2	9·4	
,, 19	38	24	,,	Bo.	=12	9·4	
,, 21	40	40	,,	La.	=9, 12+3	9·1	
,, 23	42	T.50	,,	Bn.	9−2, 12+2	9·2	
,, 29	48	T.25	,,	,,	4−1, 6+1	8·4	
,, 30	49	24	,,	Bo.	=4	8·3	
July 3	52	t.30	,,	Bn.	3−1·5, 4+1	8·2	
,, 10	59	t.22	,,	Ni.	3−2, 4+0·5	8·2	In T.94, 7·9.
,, 11	60	t.30	,,	Bn.	3+1	7·9	
,, 16	65	T.25	,,	,,	2−4, 3+1	7·9	
,, 16	65	t.22	,,	Ni.	2−3, 3+2	7·8	
,, 20	69	T.25	,,	Bn.	2−3, 3+3	7·7	
,, 24	73	15	2	Bo.	2−1, 3+4	7·6	
,, 24	73	50	1	Ma.	4+6	7·7	
,, 26	75	40	2	La.	2−2, d+1	7·6	
,, 28	77	15	1	Bo.	2−1, 3+4	7·6	
,, 29	78	T.25	,,	Bn.	2−2, 3+4	7·6	
,, 31	80	15	,,	Bo.	=2	7·4	
,, 31	80	50	2	Ma.	2−4, 4+4	7·9	
Aug. 1	81	45	1	Br.	2−4, 4+4	7·9	
,, 3	83	50	2	Ma.	=2	7·4	About.
,, 12	92	15	,,	Bo.	2−2, 4+6	7·7	
,, 12	92	t.22	1	Ni.	2−3, 3+2	7·8	
,, 17	9997	15	,,	Bo.	2−2, 4+6	7·7	
,, 20	0000	,,	,,	,,	2−4, 4+4	7·9	
,, 22	02	t.22	,,	Ni.	=3	8·0	
,, 23	03	15	,,	Bo.	2−4, 4+4	7·9	
,, 24	04	45	,,	Br.	2−6, 4+3	8·0	
,, 27	07	15	2	Bo.	=4	8·3	
,, 28	08	t.30	1	Bn.	3−0·5, 4+2	8·1	
,, 28	08	20	2	La.	=3, 4+2	8·1	
Sept. 3	14	50	1	Ma.	4+1	8·2	Slightly red.
,, 6	17	T.25	,,	Bn.	3−0·5, 4+2	8·1	
,, 6	17	t.22	,,	Ni.	4−0·5	8·3	
,, 7	18	160	,,	Br.	=4	8·3	
,, 7	18	T.25	,,	Bn.	3−1·5, 4+1	8·2	
,, 7	18	50	,,	Ma.	4+1	8·2	
,, 8	19	24	,,	Bo.	=4	8·3	
,, 10	21	50	2	Ma.	4−2	8·5	
,, 11	22	24	1	Bo.	=5	8·4	
,, 12	23	t.22	,,	Ni.	4−4, 9+3	8·7	
,, 15	26	T.25	,,	Bn.	4−2, 6+0·5	8·5	
,, 16	27	79	,,	Ma.	4−5, 12+5	8·8	
,, 20	31	24	,,	Bo.	8−1, 9+1	9·0	
,, 24	35	,,	,,	,,	9−2, 12+2	9·2	
,, 24	35	79	,,	Ma.	9−2, 12+2	9·2	
,, 24	35	45	,,	Br.	9−3, 12+1	9·3	
,, 24	0035	40	,,	La.	9−1, 12+2	9·2	

(5955) R DRACONIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Sept. 26	0037	40	1	La.	9−2, 12+1	9·3	Ruddy.
,, 26	37	79	,,	Ma.	9−2, 12+2	9·2	
,, 26	37	t.22	,,	Ni.	9−3, 13+2·5	9·4	
,, 27	38	24	,,	Bo.	9−2, 12+1	9·3	
,, 28	39	T.50	,,	Bn.	12−2, 14+2	9·6	
,, 28	39	79	,,	Ma.	12−0·5	9·5	
,, 30	41	,,	,,	,,	12−5, 16+2·5	9·9	
,, 30	41	24	2	Bo.	9−3, 12+1	9·3	
,, 30	41	40	,,	Hw.	9−3, 12+1	9·3	
Oct. 4	45	24	3	Bo.	=17, =18	10·5	
,, 6	47	T.95	1	Bn.	16−1, 18+2	10·3	
,, 11	52	79	,,	Ma.	16−1	10·3	
,, 12	53	T.94	,,	Ni.	17−1, 19+4	10·6	
,, 17	58	160	,,	Br.	18−3, 19+1	10·9	
,, 18	59	79	,,	Ma.	19−0·5, 20+2	11·0	
,, 20	61	T.94	,,	Ni.	=19	11·0	
,, 22	63	90	3	Hw.	19−1, 20+1	11·1	
,, 23	64	79	1	Ma.	18−3, 19+0·5	10·9	
,, 25	66	40	,,	La.	18−5, 19−1	11·1	
,, 28	69	T.94	,,	Ni.	=20, 22+2	11·3	
,, 31	72	160	,,	Br.	19−1, 20+1	11·1	
,, 31	72	40	,,	La.	19−5, 20−2, 22+1	11·5	
Nov. 1	73	90	3	Hw.	19−4, 20−1	11·4	
,, 5	77	T.120	1	Bn.	19−2, 20+1	11·2	
,, 5	77	183	2	Ma.	20−4, 27+4	11·6	
,, 18	90	40	1	La.	=24	11·9	About.
,, 18	90	T.94	,,	Ni.	22−2·5, 27+2	11·8	
,, 22	94	120	,,	Br.	27−3, 32+2	12·3	
,, 22	94	T.120	,,	Bn.	27−1	12·1	
,, 22	94	183	,,	Ma.	27−2	12·2	
,, 25	0097	T.94	,,	Ni.	22−3, 27+1·5	11·9	
Dec. 4	0106	160	,,	Br.	=32	12·5	
,, 7	09	T.94	,,	Ni.	27−3, 32+3	12·3	
,, 18	20	,,	,,	,,	27−4, 32+1	12·4	
,, 18	20	T.150	,,	Bn.	32−1	12·6	
,, 24	26	120	,,	Br.	32−1	12·6	
,, 28	30	183	,,	Ma.	27−2	12·2	
,, 30	32	T.94	,,	Ni.	27−4·5, 32+1	12·4	
,, 30	32	T.120	,,	Bn.	27−2, 32+2	12·3	
,, 31	33	T.200	,,	,,	27−3	12·3	
1914.							
Jan. 2	35	160	,,	Br.	27−1	12·1	
,, 17	50	T.94	,,	Ni.	22−3, 27+1·5	11·9	
,, 23	56	160	,,	Br.	20−3, 22+1	11·5	
,, 25	58	T.94	,,	Ni.	=22	11·6	
,, 26	59	T.120	,,	Bn.	22−1, 27+3	11·7	
Feb. 3	67	24	2	Bo.	19−1, 20+1	11·1	
,, 5	69	T.94	1	Ni.	=19	11·0	
,, 12	76	,,	,,	,,	16−4, 17−5, 19+3	10·7	
,, 17	0181	70	2	Bo.	16−2, 18+2	10·4	

(5955) R DRACONIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Feb. 18	0182	160	1	Br.	16−2, 18+3	10·3	
„ 18	82	T.50	„	Bn.	14−1, 16+2·5	9·9	
„ 22	86	„	„	„	12−1, 14+3	9·5	
„ 23	87	70	„	Bo.	12−4, 16+4	9·8	
„ 26	90	T.50	„	Bn.	6−4·5, 9+1	9·0	
„ 28	92	24	2	Bo.	9−3, 12+1	9·3	
Mar. 1	93	45	1	Br.	=9	9·1	
„ 1	93	t.22	2	Ni.	=9	9·1	
„ 6	98	T.50	1	Bn.	4−2, 6+0·5	8·5	
„ 7	0199	24	„	Bo.	=4	8·3	
„ 11	0203	t.22	„	Ni.	=4	8·3	
„ 16	08	45	„	Br.	4+3	8·0	
„ 18	10	50	„	Ma.	4+4	7·9	
„ 21	13	T.25	„	Bn.	2−3, 3+3	7·7	
„ 21	13	40	„	Hw.	1−10, 4+4	7·9	
„ 22	14	t.22	„	Ni.	2−3, 3+3	7·7	
„ 27	19	45	„	Br.	2−4, 4+4	7·9	
„ 27	19	T.25	„	Bn.	2−0·5, 3+5	7·5	
„ 28	20	24	„	Bo.	2−4, 4+4	7·9	
„ 31	23	T.25	„	Bn.	2−2, 3+4	7·6	
Apr. 4	27	t.22	„	Ni.	2−2, 3+4	7·6	Whitish yellow.
„ 5	28	40	„	Bc.	2−4, d−1, 4+4	7·8	
„ 9	32	„	„	„	2−4, d−1, 4+4	7·8	
„ 12	35	24	2	Bo.	2−6, 4+3	8·0	
„ 12	35	50	„	Ma.	1−8, 4+5	7·7	
„ 12	35	t.22	„	Ni.	2−3, 3+3	7·7	
„ 13	36	40	1	Bc.	2−2, d+1	7·6	
„ 15	38	45	„	Br.	2−3, 4+5	7·8	
„ 18	41	24	„	Bo.	2−6, 4+1·5	8·1	
„ 18	41	t.22	„	Ni.	2−4, 3+2	7·8	
„ 21	44	40	„	Bc.	d−2, 3+1	7·9	
„ 22	45	„	„	Hw.	=4	8·3	
„ 24	47	45	„	Br.	4+4	7·9	
„ 25	48	24	„	Bo.	3−1, 4+1	8·2	
„ 25	48	T.50	„	Bn.	2−4·5, 3+1	7·9	
„ 25	48	50	„	Ma.	4+4	7·9	
„ 26	49	34	„	Cr.	4+2	8·1	
„ 27	50	„	„	„	4+4	7·9	
„ 28	51	t.30	„	Bn.	2−4·5, 3+1	7·9	
May 2	55	24	„	Bo.	3−1, 4+1	8·2	
„ 2	55	40	„	Hw.	4−1·5, 9+6	8·4	
„ 3	56	„	„	Bc.	=3, 4+2	8·1	
„ 7	60	„	„	„	3−1, =4, g+6	8·2	
„ 8	61	24	2	Bo.	=4	8·3	
„ 16	69	45	1	Br.	4−1	8·4	
„ 16	69	34	„	Cr.	=5	8·4	
„ 17	70	T.50	„	Bn.	4−1·5, 6+1	8·4	
„ 17	70	t.22	„	Ni.	4−5, 9+3	8·8	
„ 18	71	40	2	Hw.	4−4, 9+4	8·7	
„ 21	74	24	1	Bo.	=4, 5+1	8·3	
„ 21	74	T.50	„	Bn.	4−2, 6+0·5	8·5	
„ 25	0278	„	„	„	6−4, 9+1·5	8·9	

(5955) R DRACONIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
May 26	0279	45	1	Br.	9−2, 12+1	9·3	
,, 28	81	24	2	Bo.	9−1, 10+1	9·1	
June 3	87	,,	,,	,,	=12, 13+1	9·5	
,, 3	87	t.22	1	Ni.	13−3, 16+2	9·9	
,, 4	0288	T.50	,,	Bn.	12−1, 14+2·5	9·5	
,, 16	0300	160	,,	Br.	=16	10·2	
,, 18	02	24	3	Bo.	16−2, 18+2	10·4	
,, 25	09	T.120	1	Bn.	19−0·5, 20+2	11·0	
,, 26	10	70	2	Bo.	19−1, 20+1	11·1	
,, 27	11	160	1	Br.	18−2, 19+2	10·8	
,, 30	14	T.94	,,	Ni.	17−4, 19+1	10·9	
July 4	18	T.120	,,	Bn.	19−2, 20+1	11·2	
,, 7	21	T.94	,,	Ni.	20−1, 22+3	11·3	
,, 9	23	79	,,	Ma.	=20	11·3	About.
,, 17	31	T.120	,,	Bn.	22−1, 27+3	11·7	
,, 17	31	T.94	,,	Ni.	22−1, 27+3	11·7	
,, 23	37	79	,,	Ma.	=27	12·0	About.
Aug. 2	47	T.94	,,	Ni.	27−3, 32+3	12·3	
,, 3	48	160	,,	Br.	27−2, 32+2	12·3	
,, 11	56	T.94	,,	Ni.	27−3, 32+2	12·3	
,, 19	64	,,	,,	,,	27−3, 32+1	12·4	
,, 21	66	160	,,	Br.	32−1	12·6	About.
,, 26	71	T.120	,,	Bn.	32−1	12·6	
Sept. 3	79	T.94	,,	Ni.	27−3, 32+2	12·3	
,, 10	86	120	,,	Br.	27+1	11·9	
,, 11	87	T.150	,,	Bn.	22−3, 27+1	11·9	
,, 15	91	T.94	,,	Ni.	22−1, 27+3·5	11·7	
,, 19	95	T.150	,,	Bn.	20−1, 22+1	11·4	
,, 23	99	160	,,	Br.	19−1, 20+1	11·1	
,, 23	99	40	3	Hw.	19−3, 20−1	11·3	
,, 23	0399	T.94	1	Ni.	=20	11·3	
,, 24	0400	T.120	,,	Bn.	19−2, 20+1	11·2	
Oct. 5	11	40	,,	Bc.	17−3	10·8	
,, 6	12	T.94	,,	Ni.	17−1, 19+4	10·6	
,, 11	17	T.120	,,	Bn.	16−3, 18+1	10·5	
,, 12	18	160	,,	Br.	=16	10·2	
,, 18	24	T.50	,,	Bn.	12−2, 14+2	9·6	
,, 20	26	40	,,	Bc.	=14, 16+4	9·8	
,, 27	33	,,	2	Hw.	=9	9·1	
Nov. 2	39	t.22	1	Ni.	4−1	8·4	
,, 3	40	40	,,	Hw.	1−11, 4+3	8·0	
,, 10	47	60	,,	Br.	4+4	7·9	
,, 12	49	t.22	,,	Ni.	2−8, 3+2, 4+4	8·0	
,, 14	51	T.25	,,	Bn.	2−4, 3+1	7·9	
,, 18	55	,,	,,	,,	2−4, 3+1	7·9	
,, 21	58	t.22	,,	Ni.	2−3, 3+2	7·8	
,, 25	62	40	,,	Hw.	1−9, 4+5	7·8	
,, 27	0464	60	,,	Br.	2−1	7·5	

(5955) R DRACONIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Dec. 1	0468	T.50	1	Bn.	2−1, 3+4	7·6	
,, 2	69	t.22	,,	Ni.	=2	7·4	Yellowish white.
,, 4	71	40	,,	Bc.	b−2, =2	7·4	
,, 5	72	,,	,,	Hw.	1−8, 4+6	7·7	
,, 12	79	,,	,,	Bc.	2−4, 3+2	7·8	
,, 14	81	60	,,	Br.	2+3	7·1	
,, 16	83	T.50	,,	Bn.	2−1, 3+4	7·6	
,, 16	83	t.22	,,	Ni.	2−1, 3+4	7·6	
,, 21	88	,,	,,	,,	=2	7·4	Yellowish white.
,, 21	88	40	,,	Hw.	1−10, 4+4	7·9	
,, 30	97	t.22	,,	Ni.	2−2, 3+4	7·6	
,, 31	0498	45	,,	Br.	2−2	7·6	

(6044) S HERCULIS. (V. 2.)

H.D. 164715.

NOTES.

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Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
May 1	8793	p.40	1	Bn.	6−8·5, 7−6, 8+6, 9+4	9·5	p.=2″ O.G.
,, 13	8805	t.60	,,	,,	=6, =7	8·8	
,, 15	07	T.50	,,	,,	=6	8·8	
,, 15	07	79	2	Ma.	7−1·5	9·0	
,, 16	08	50	1	,,	5−3, 7+3	8·6	
June 3	26	,,	,,	,,	6+1	8·7	
,, 3	26	T.50	,,	Bn.	4−1, 5−3, 6+1, 7+6	8·4	
,, 13	36	50	,,	Ma.	5−2, 6+2	8·5	
,, 14	37	T.50	,,	Bn.	4−1, =5	8·3	
,, 19	42	,,	,,	,,	4−1·5, 5+1	8·2	
,, 24	47	50	,,	Ma.	5−1, 6+3·5	8·4	
,, 26	49	,,	,,	,,	4+0·5, 5+1, 6+3	8·2	
July 3	56	T.50	,,	Bn.	4−1·5, 5+1	8·2	
,, 4	57	50	2	Ma.	=4	8·1	
,, 11	64	,,	1	,,	=5	8·3	
,, 11	64	T.50	,,	Bn.	4+1	8·0	
,, 13	66	t.30	,,	,,	3−3·5, 4+1	8·0	
,, 22	75	50	,,	Ma.	=5, 6+4	8·3	
,, 23	76	t.30	,,	Bn.	3−3, 4+1·5	7·9	
,, 25	8878	50	,,	Ma.	5−1, 6+4	8·4	

(6044) S HERCULIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Aug. 2	8886	50	1	Ma.	5−3, 6+2	8·6	
,, 2	86	t.30	2	Bn.	3−4, 4+0·5	8·0	
,, 4	88	50	,,	Ma.	5−2, 6+2	8·5	
,, 6	90	t.30	1	Bn.	4−0·5, 5+2	8·1	
,, 7	91	50	,,	Ma.	5−3·5, 6+1	8·7	
,, 10	8894	t.60	,,	Bn.	4−1·5, 5+1	8·2	
,, 19	8903	p.26	,,	,,	4−5, 5−3, 6+1, 7+2	8·6	p.=2″ O.G.
,, 24	08	50	,,	Ma.	6−5, 12+10	9·3	
,, 30	14	t.30	,,	Bn.	6−0·5, =7	8·8	
Sept. 3	18	t.60	,,	,,	6−9·5, 7−8, 8+4, 9+3	9·7	
,, 8	23	,,	,,	,,	7−8, 8+3	9·7	
,, 20	35	T.95	,,	,,	8+1	10·0	
,, 27	42	,,	,,	,,	=10	10·5	
Oct. 16	61	T.120	2	,,	=17	10·9	About. Difficult.
Nov. 1	77	,,	1	,,	18−0·5, 28+1	11·8	
,, 9	85	,,	,,	,,	28−1	12·0	
,, 20	8996	,,	2	,,	=28	11·9	About.
1911.							
Jan. 31	9068	T.50	1	,,	7−9, 8+3	9·8	
Mar. 4	9100	,,	,,	,,	4−6, 5−3, 6+1, 7+2	8·7	
,, 9	05	,,	,,	,,	5−4, 7+1·5	8·7	
Apr. 3	30	,,	,,	,,	5−1, 7+4	8·4	
,, 16	43	t.30	,,	,,	3−3·5, 4+1	8·0	
,, 21	48	15	,,	Wl.	3−3, 4+2	7·9	Orange.
,, 23	50	t.30	,,	Bn.	3−2, 4+2	7·8	
,, 30	57	60	2	Wl.	3−1, 4+2, 5+4	7·8	Orange.
May 2	59	T.25	1	Bn.	3−3·5, 4+1	8·0	
,, 4	61	t.30	,,	,,	3−2, 4+2	7·8	
,, 8	65	T.50	,,	,,	3−3·5, 4+1	8·0	
,, 14	71	t.60	,,	,,	4−0·5	8·1	
,, 22	79	T.50	,,	,,	4−2, 5+0·5	8·3	
,, 24	81	,,	,,	,,	5−1	8·4	
,, 24	81	34	,,	Cr.	=5	8·3	
,, 24	81	45	,,	F.G.B.	3−4, 4+1	8·0	
,, 29	86	T.50	,,	Bn.	5−1, 6+4	8·4	
June 1	89	34	,,	Cr.	4−1, 5+1	8·2	
,, 3	91	45	,,	F.G.B.	=6, =7	8·8	
,, 4	92	60	,,	Gh.	5−3, 7+3	8·6	
,, 7	95	34	,,	Cr.	=5	8·3	
,, 7	95	T.50	,,	Bn.	5−2, 6+2	8·5	
,, 8	9196	34	,,	Cr.	=6	8·8	
,, 17	9205	T.50	,,	Bn.	5−3·5, 6+1	8·7	
,, 18	06	30	,,	Gh.	7−4·5, 8+7	9·3	
,, 18	06	45	,,	F.G.B.	=7	8·9	
,, 20	08	34	,,	Cr.	=6	8·8	
,, 28	9216	30	,,	Gh.	5−14, 8+3·5	9·7	

(6044) S HERCULIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
July 2	9220	T.50	1	Bn.	7−9, 8+3	9·8	
„ 4	22	45	„	F.G.B.	7−6, 8+6	9·5	
„ 12	30	90	„	Bh.	5−2, 6+2	8·5	Doubtful. [C.L.B.]
„ 12	30	60	„	Gh.	=8, =9	10·1	
„ 16	34	T.50	„	Bn.	8+1, 9+0·5	10·0	
„ 18	36	30	„	Gh.	=8	10·1	
„ 20	38	90	„	Bh.	7−8, 8+4	9·7	
„ 21	39	45	„	F.G.B.	7−10, 8+1	9·9	
„ 27	45	60	„	Gh.	=10, =13	10·6	
„ 27	45	T.95	„	Bn.	10−0·5, 13+1	10·6	
Aug. 3	52	120	„	Gh.	=10	10·5	
„ 7	56	160	„	Br.	=13	10·6	
„ 13	62	60	„	Gh.	=17	10·9	
„ 14	63	90	2	Bh.	10−1, 13+1	10·6	
„ 15	64	„	1	„	=10	10·5	
„ 15	64	66	„	F.G.B.	=13	10·6	
„ 25	74	160	„	Br.	13−5, 20+3	11·1	
„ 25	74	60	„	Gh.	10−2, 17+2	10·7	
„ 27	76	66	„	F.G.B.	=20	11·4	
Sept. 3	83	60	„	Cr.	13−2	10·8	
„ 10	90	90	„	Bh.	13−1, 14+1	10·7	
„ 11	91	120	2	Gh.	=20	11·4	
„ 17	9297	160	„	Br.	=20	11·4	About.
„ 20	9300	90	1	Bh.	=15	11·0	
„ 24	04	120	„	Gh.	=18	11·8	
„ 26	06	T.120	„	Bn.	18−1	11·9	
Oct. 1	11	66	„	F.G.B.	=18	11·8	
„ 16	26	90	„	Bh.	=13	10·6	
„ 21	31	132	„	F.G.B.	17−6, 18+3	11·5	
„ 26	36	T.120	„	Bn.	17−6, 18+3	11·5	
Nov. 1	42	132	„	F.G.B.	=10	10·5	
„ 14	55	T.120	„	Bn.	10−1	10·6	
„ 29	70	T.50	„	„	7−10, 8+1	9·9	
Dec. 9	9380	„	„	„	6−8·5, 7−7, 8+5, 9+4	9·6	
„ 31	9402	57	2	Bh.	3−3, =4, 5+3	8·0	
1912.							
Jan. 22	24	„	„	„	1−3, 2+3	6·7	Deep ruby.
„ 27	29	90	1	„	1−3, 2+3	6·7	„ „
„ 29	31	57	2	„	1−2, 2+4	6·6	Red.
Feb. 11	44	„	„	„	1−6, =2, 3+6	7·0	
„ 20	53	„	„	„	=2	6·9	
„ 26	59	„	1	„	2−3, 3+3	7·3	Orange.
„ 29	62	„	2	„	=3	7·6	Faint orange.
Mar. 8	70	„	„	„	3−2, 4+2	7·8	
„ 15	77	„	1	„	=4	8·1	
„ 18	9480	„	„	„	4−1, 5+1	8·2	

(6044) S HERCULIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Mar. 19	9481	57	1	Bh.	=5	8·3	
,, 23	85	,,	,,	,,	5−2, 6+2	8·5	Pale orange.
,, 27	89	,,	,,	,,	5−4, 6+1	8·7	
,, 31	93	,,	2	,,	6−4, =7, 9+8	9·1	
Apr. 6	9499	,,	,,	,,	=7	8·9	
,, 8	9501	,,	1	,,	=6, =7	8·8	Pale yellow.
,, 10	03	,,	2	,,	6−6, 7−6, 8+6, 9+6	9·4	
,, 13	06	,,	,,	,,	6−6, 9+6	9·4	
,, 16	09	,,	,,	,,	6−8, 7−6, 8+4, 9+6	9·5	
,, 19	12	,,	1	F.G.B.	7−2, 8+10	9·1	
,, 20	13	,,	2	Bh.	7−9, 8+3	9·8	
,, 22	15	,,	1	,,	7−6, 8+6	9·5	
,, 26	19	,,	2	,,	=8, =9	10·1	
,, 27	20	,,	,,	F.G.B.	7−10, 8+2	9·9	
,, 29	22	T.120	1	Bn.	10+2·5	10·3	
May 8	31	,,	,,	,,	10+1	10·4	
,, 12	35	45	2	Bh.	=11, =12	10·3	
,, 14	37	,,	,,	,,	=11, =12	10·3	
,, 16	39	132	1	F.G.B.	=9	10·0	
,, 20	43	,,	,,	,,	9−3, 13+3	10·3	
,, 20	43	90	,,	Bh.	9−3, =12, 13+3	10·3	
,, 23	46	45	,,	,,	=10, 11−2, 13+2	10·5	
,, 24	47	132	,,	F.G.B.	=10	10·5	
,, 24	47	.120	2	Gh.	=10	10·5	
,, 25	48	90	,,	Bh.	=10, =13	10·6	
,, 28	51	,,	,,	,,	9−3, 13+3	10·3	
June 2	56	132	1	F.G.B.	20−0·5, 18+3	11·5	
,, 3	57	T.120	,,	Bn.	13−3·5, 16+2	11·0	
,, 6	60	,,	,,	,,	10−2, =16, =17	10·9	
,, 6	60	90	2	Bh.	12−3, =13, =14, 17+3	10·6	
,, 10	64	,,	1	,,	10−2, 17+2, =14	10·7	
,, 10	64	T.120	,,	Bn.	=16, 17−2	11·1	
,, 10	64	120	,,	Gh.	=20	11·4	
,, 14	68	90	2	Bh.	=14, =17	10·8	
,, 18	72	132	1	F.G.B.	18+1, 20−2	11·7	
,, 19	73	90	2	Bh.	10−3, =14, =17, 16+3	10·8	
,, 20	74	120	1	Gh.	=20	11·4	
,, 21	75	T.120	,,	Bn.	17−7, 18+2	11·6	
,, 23	77	,,	,,	,,	16−2, 17−7, 18+2, 19+1	11·4	
,, 29	83	90	2	Bh.	=15, =16, 17−3, 20+3	11·1	
July 5	89	,,	,,	,,	15−4, 18+4, =20, =22	11·4	
,, 8	92	,,	,,	,,	=20, =22	11·4	
,, 11	95	,,	1	,,	19−1, =22, =24, 25+1	11·5	
,, 11	95	T.120	,,	Bn.	=18	11·8	
,, 14	9598	,,	,,	,,	=18	11·8	

(6044) S HERCULIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
July 15	9599	90	2	Bh.	=23, =24, =25	11·6	
,, 25	9609	,,	,,	,,	=26, =28	11·9	
Aug. 2	17	,,	,,	,,	22 −2, =24, =25, 26+2	11·6	
,, 12	27	,,	,,	,,	=23, =24, =25	11·6	
,, 19	34	45	,,	,,	=25, =26	11·8	
,, 20	35	90	,,	,,	=18, =25	11·7	
,, 29	44	,,	,,	,,	15−4, 18+4, =20	11·4	
,, 30	45	T.120	1	Bn.	=16, 17−2	11·1	
Sept. 2	48	90	2	Bh.	16−1, 20+1, =21	11·3	
,, 5	51	,,	,,	,,	=22	11·5	
,, 6	52	45	1	,,	16−1, 20+1, =21	11·3	
,, 10	56	90	,,	,,	=10	10·5	
,, 17	63	45	,,	,,	9−4, =11, =12, 17+4	10·4	
,, 17	63	T.95	2	Bn.	=10	10·5	About.
,, 18	64	T.120	1	,,	9−4, 10+1	10·4	
,, 20	66	45	,,	Bh.	=8	10·1	
,, 22	68	T.120	,,	Bn.	8−2, 9−1, 10+2, =11	10·2	
,, 22	68	45	,,	Bh.	6−10, 9+2·5	9·8	
,, 30	76	,,	2	,,	7−2, 8+9	9·1	
Oct. 2	78	,,	1	,,	7−2, 8+9	9·1	
,, 2	78	T.50	,,	Bn.	7−3, 8+9	9·2	
,, 4	80	45	,,	Bh.	=6, =7	8·8	
,, 6	82	T.50	,,	Bn.	6−9, 7−8, 8+4, 9+3·5	9·7	Doubtful. [C.L.B.]
,, 7	83	45	,,	Bh.	=7	8·9	
,, 11	87	,,	,,	,,	4−5, 5−3, 6+1, 7+2	8·6	
,, 17	93	,,	2	,,	4−4, 5−2, 6+2, 7+4	8·5	
,, 22	9698	,,	,,	,,	4−2·5, =5, 6+5	8·3	
,, 25	9701	,,	1	,,	3−4, =4, 5+4	8·0	
,, 29	05	,,	,,	,,	3−3·5, 4+1	8·0	Deep red.
Nov. 1	08	T.50	,,	Bn.	3−4, 4+1	8·0	
,, 3	10	,,	,,	,,	3−3·5, 4+1	8·0	
,, 3	10	45	,,	Bh.	3−1·5, 4+3	7·8	
,, 7	14	,,	,,	,,	3−2, 4+2	7·8	
,, 13	20	T.50	,,	Bn.	3−3, 4+1·5	7·9	
,, 17	24	45	,,	Bh.	3−2, 4+2	7·8	
,, 20	27	,,	,,	,,	=3	7·6	Very red.
,, 24	31	,,	2	,,	=3	7·6	
,, 26	33	,,	,,	,,	=3	7·6	
,, 27	34	T.50	1	Bn.	3−3, 4+1·5	7·9	
,, 30	37	,,	,,	,,	3−3·5, 4+1	8·0	
Dec. 5	42	45	,,	Bh.	1−8, =3, 4+8	7·4	
,, 11	48	,,	,,	,,	2−2, 3+4	7·2	Very deep red.
,, 16	53	,,	,,	,,	1−6, =2, 3+6	7·0	
,, 22	59	,,	,,	,,	2−2, 3+4	7·2	
,, 29	66	T.25	,,	Bn.	2−2, 3+4	7·2	Golden yellow.
,, 31	9768	45	,,	Bh.	1−6, 2−1, 3+6	7·0	

(6044) S HERCULIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Jan. 5	9773	45	1	Bh.	2−4, 3+4	7·3	
„ 8	76	„	„	„	3−3, 4+1·5	7·9	
„ 11	79	„	„	„	3−5, =4, 5+2·5	8·1	
„ 17	85	„	„	„	4−2·5, =5, 6+5	8·3	
„ 26	94	„	„	„	5−5, =6, =7	8·8	
„ 31	9799	„	„	„	=6, =7	8·8	
Feb. 1	9800	T.50	„	Bn.	=6, =7	8·8	
„ 4	03	90	2	Bh.	6−9, =8, =9, 10+9	9·9	
„ 10	09	„	1	„	6−9, 10+9	9·7	
„ 12	11	45	„	„	8+2, 10+5	9·9	
„ 21	20	90	2	„	=11, 10+2	10·3	
„ 27	26	45	1	„	=8, =9, 10+4	10·1	
Mar. 4	31	90	„	„	8−5, 9−5, 10+1	10·5	
„ 11	38	„	„	„	=10	10·5	
„ 14	41	45	2	„	=10	10·5	
„ 20	47	90	1	„	10−1	10·6	
„ 27	54	„	2	„	9−4, =10, 13+1	10·5	
„ 30	57	„	„	„	13−2, =14, 16+2, =17	10·8	
Apr. 1	59	„	1	„	15−1, 16+1, 17−3, 18+6	11·1	
„ 5	63	„	„	„	=20, =21, =22	11·4	
„ 7	65	„	„	„	=20, =22	11·4	
„ 11	69	„	2	„	=20, =22	11·4	
„ 17	75	„	1	„	20−2, 18+2, =23	11·6	
„ 25	83	„	2	„	=25, =26	11·8	
May 1	89	T.120	1	Bn.	18−1, 28+0·5	11·9	
„ 1	89	60	2	Gh.	=18	11·8	
„ 4	92	150	„	Bh.	24−2, 30+2	11·8	
„ 6	94	79	1	Ma.	28+1	11·8	
„ 10	98	T.120	„	Bn.	18−1, 28+0·5	11·9	
„ 11	99	60	„	Gh.	=18	11·8	
„ 11	9899	90	2	Bh.	=25, =26	11·8	
„ 13	9901	T.120	1	Bn.	18−1, 28+0·5	11·9	
„ 13	01	79	„	Ma.	20−1·5	11·6	
„ 14	02	90	„	Bh.	=18, 25−2	11·8	
„ 16	04	183	2	Ma.	18−4·5	12·2	
„ 21	09	90	1	Bh.	18−1, =28	11·9	
„ 25	13	T.120	„	Bn.	=28	11·9	
„ 25	13	60	2	Gh.	=28	11·9	
„ 26	14	79	1	Ma.	=28	11·9	About.
„ 30	18	90	„	Bh.	28−1, 31+1	12·0	
„ 31	19	79	„	Ma.	28+1	11·8	
June 3	22	T.120	„	Bn.	18−1, =28	11·9	
„ 4	23	150	„	Bh.	20−5, =31, C+7·5	12·0	
„ 7	26	T.150	„	Bn.	18−1, 28+0·5	11·9	
„ 7	26	90	„	Bh.	20−6, 18−1, C+6	12·0	
„ 8	27	30	2	Gh.	=18	11·8	
„ 10	29	79	1	Ma.	=28	11·9	
„ 14	33	150	„	Bh.	18+1	11·7	
„ 21	40	90	„	„	16−2, 20+1	11·3	
„ 27	9946	„	2	„	10−5, 17−2	11·0	

(6044) S HERCULIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
June 27	9946	T.120	1	Bn.	17−6, 18+3	11·5	
,, 27	46	79	,,	Ma.	17−5, 18+5	11·3	
,, 29	48	60	,,	Gh.	=16	11·1	
,, 30	49	90	2	Bh.	10−2, =13	10·7	
July 3	52	T.120	1	Bn.	17−2·5, 18+7	11·1	
,, 7	56	90	2	Bh.	13−1, 17+1	10·8	
,, 11	60	T.95	1	Bn.	13−3, 16+1·5	11·0	
,, 11	60	79	2	Ma.	10−1, =13	10·6	
,, 19	68	90	1	Bh.	8−5, =10, 16+5	10·6	
,, 24	73	T.95	,,	Bn.	8−3, =9, 10+1·5, 11+1	10·2	
,, 24	73	79	,,	Ma.	9−0·5	10·1	
,, 25	74	90	,,	Bh.	10+1, 13+2	10·4	
,, 29	78	T.95	,,	Bn.	7−9, 8+2, 9+1	9·9	
,, 31	80	79	,,	Ma.	9+1·5	9·9	
Aug. 3	83	34	2	Cr.	7−4	9·3	
,, 5	85	79	1	Ma.	9+3	9·7	
,, 6	86	45	,,	Bh.	7−5, 8+7	9·4	
,, 9	89	,,	,,	,,	6−3, 7−3, 9+9	9·1	
,, 16	9996	,,	,,	,,	6−2, 7−1	9·0	
,, 24	0004	,,	2	,,	=6, =7	8·8	
Sept. 2	13	,,	,,	,,	=6, =7	8·8	
,, 3	14	50	1	Ma.	5−4, 6+1	8·7	
,, 5	16	45	,,	Bh.	5−1, 4−2, 6+3, 7+5	8·4	
,, 6	17	T.50	,,	Bn.	4−2, 5+0·5	8·3	
,, 7	18	50	2	Ma.	5−1, 6+4	8·4	
,, 9	20	45	1	Bh.	4−1, 5+1	8·2	
,, 12	23	50	,,	Ma.	=4	8·1	About.
,, 13	24	45	2	Bh.	3−8, =4, =5, 6+4	8·3	
,, 20	31	,,	1	,,	=4, 5+2	8·1	
,, 24	35	T.25	,,	Bn.	3−1·5, 4+3	7·8	
,, 26	37	50	,,	Ma.	=4	8·1	About. Reddish.
,, 27	38	45	,,	Bh.	3−1·5, 4+3	7·8	
,, 28	39	T.25	,,	Bn.	3−3, 4+1·5	7·9	
,, 30	41	50	2	Ma.	5−1, 6+4	8·4	
Oct. 1	42	45	1	Bh.	2−6, =3, 4+6	7·5	
,, 6	47	,,	,,	,,	3+2	7·4	
,, 9	50	T.25	,,	Bn.	2−6, 3+0·5	7·5	
,, 16	57	45	,,	Bh.	3+1, 4+3, 5+5	7·7	
,, 20	61	,,	,,	,,	3−2, 4+2	7·8	
,, 22	63	T.25	,,	Bn.	3−1·5, 4+3	7·8	
,, 29	70	90	2	Bh.	3−4, =4, 5+4	8·0	
Nov. 1	73	T.25	1	Bn.	3−4, 4+1	8·0	
,, 1	73	45	,,	Bh.	4+2, 5+5	7·9	
,, 8	80	90	,,	,,	=4, 5+2	8·1	
,, 17	89	45	2	,,	4−6, 5−2, 6+2, 7+2	8·6	
,, 22	0094	T.50	1	Bn.	4−6, =6, 7+2	8·7	
,, 28	0100	90	2	Bh.	6−3, 7−4	9·2	
Dec. 9	11	,,	,,	,,	7−6, 8+6	9·5	
,, 16	0118	,,	1	,,	6−10·5, 10+7	9·8	

(6044) S HERCULIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Dec. 23	0125	90	2	Bh.	8−2, 10+2	10·3	
,, 29	31	,,	1	,,	=10	10·5	
1914.							
Jan. 5	38	,,	2	,,	10−3, =17	10·8	
,, 6	39	T.95	1	Bn.	10−1, 13+0·5	10·6	
,, 25	58	90	,,	Bh.	=20, =22	11·4	
Feb. 3	67	150	,,	,,	24−2, 30+2, C+5	11·9	
,, 4	68	T.120	,,	Bn.	18−1, 28+0·5	11·9	
,, 5	69	150	,,	Bh.	22−6, =26, C+6	12·0	
,, 15	79	90	2	,,	25−5, C+5	12·1	
,, 18	82	150	,,	,,	25−5, C+5	12·1	
,, 27	91	,,	1	,,	=18, 20−4, C+8	11·8	
,, 28	0192	T.120	,,	Bn.	=31, =33	12·2	
Mar. 12	0204	150	2	Bh.	=22, =23, =25	11·6	
,, 21	13	,,	,,	,,	18+1, =19, =20	11·5	
,, 25	17	90	,,	,,	18−1	11·9	
Apr. 1	24	,,	,,	,,	20−2, 18+2	11·6	
,, 12	35	150	1	,,	17−7, 18+2, =20	11·5	
,, 18	41	60	,,	Gh.	=16	11·1	
,, 19	42	120	2	Ga.	=18, =28	11·9	
,, 19	42	90	1	Bh.	17−4, 18+4	11·3	
,, 20	43	120	2	Ga.	=18, 28+2	11·8	
,, 21	44	,,	1	,,	18+2, =21	11·5	
,, 22	45	,,	2	,,	10−5, =21	11·2	
,, 25	48	,,	,,	,,	10−3, =21	11·1	
,, 25	48	30	1	Gh.	=22	11·5	
,, 26	49	150	,,	Bh.	9−6, 10−2, 16+4, 17+3	10·7	
,, 27	50	T.120	,,	Bn.	=10, =13	10·6	
,, 28	51	120	2	Ga.	10−5, =16	11·1	
May 1	54	,,	,,	,,	13−2, =17	10·9	
,, 2	55	,,	,,	,,	13−2, 14−2	10·9	
,, 2	55	150	1	Bh.	10−1, 13+1	10·6	
,, 5	58	120	2	Ga.	=10, =13	10·6	
,, 10	63	90	1	Bh.	=8, =9	10·1	
,, 14	67	120	2	Ga.	10+1, =13	10·5	
,, 15	68	60	1	Gh.	11−1, 10+1, =12	10·4	
,, 16	69	30	,,	,,	=12	10·3	
,, 16	69	T.120	,,	Bn.	6−11, 7−10, 8+2, 9+1·5	9·9	
,, 16	69	34	,,	Cr.	9+4	9·6	
,, 18	71	90	,,	Bh.	=8, =9	10·1	
,, 19	72	T.95	,,	Bn.	6−10·5, 7−9, 8+3, 9+2	9·8	
,, 21	74	T.50	,,	,,	6−10·5, 7−9, 8+3, 9+2	9·8	
,, 21	74	30	,,	Gh.	7−9, 8+2	9·8	
,, 25	0278	T.50	,,	Bn.	6−10, 7−9, 8+3, 9+2·5	9·8	

(6044) S HERCULIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
May 31	0284	45	2	Bh.	6−4, 10+13	9·2	
,, 31	84	120	,,	Ga.	9+2, 10+5, 11+1	10·0	
June 2	86	60	1	,,	9+3, 11+1	10·0	
,, 3	87	45	,,	Bh.	7−2, 8+9	9·1	
,, 7	91	60	2	Ga.	6−5, 7+5	9·3	
,, 10	94	,,	1	,,	6−3, 7−3	9·1	
,, 10	94	45	,,	Bh.	=6	8·8	
,, 10	94	40	,,	Bc.	5−5, =6	8·8	
,, 13	0297	T.50	,,	Bn.	=6, =7	8·8	
,, 19	0303	45	,,	Bh.	4−3, 6+3	8·4	
,, 21	05	T.50	,,	Bn.	=6, 7+0·5	8·8	
,, 24	08	,,	,,	,,	4−5, 5−3, 6+2, 7+2·5	8·6	
,, 25	09	90	,,	Bh.	=4	8·1	
,, 26	10	60	,,	Ga.	5−1, 6+1, 7+2	8·6	
,, 27	11	,,	,,	,,	=5, 6+1, 7+3	8·5	
,, 27	11	79	2	Ma.	=5, 6+2	8·4	
,, 28	12	60	1	Ga.	4−1, =5, 6+1	8·4	
,, 29	13	50	,,	Ma.	=5, 6+1·5	8·5	
,, 29	13	90	,,	Bh.	3−3·5, 4+1	8·0	
,, 30	14	60	,,	Ga.	=5, 6+1, 7+3	8·5	
July 2	16	40	,,	Bc.	5−1, 6+4	8·4	
,, 3	17	45	,,	Bh.	3−1·5, 4+3	7·8	
,, 4	18	60	,,	Ga.	4−1, =5, 6+3	8·3	Dull red.
,, 4	18	T.50	,,	Bn.	=4	8·1	
,, 6	20	45	,,	Bh.	=3	7·6	
,, 7	21	60	2	Ga.	=4, 5+1	8·2	
,, 8	22	40	1	Bc.	5−1, 6+4	8·4	
,, 9	23	T.25	,,	Bn.	2−5, 3+1·5	7·4	
,, 13	27	45	,,	Bh.	2−5, 3+1	7·5	
,, 14	28	40	,,	Bc.	3−4, 4+1	8·0	
,, 18	32	45	,,	Bh.	2−5, 3+1	7·5	
,, 19	33	60	,,	Ga.	3−3, =4, 5+2	8·0	
,, 23	37	50	,,	Ma.	4−0·5, 5+2	8·1	
,, 28	42	45	,,	Bh.	2 4, 3+2·5	7·3	
,, 29	43	T.50	,,	Bn.	2−4·5, 3+2	7·4	
,, 30	44	45	,,	Bh.	2−4, 3+2·5	7·3	
Aug. 2	47	60	2	Ga.	4+1, 5+3	8·0	
,, 3	48	45	1	Bh.	2−2, 3+4	7·2	
,, 12	57	,,	,,	,,	2−3, 3+3	7·3	
,, 12	57	60	,,	Ga.	3−5, 4+1, 5+3	8·0	
,, 14	59	,,	2	,,	3−3, =4, 5+3	8·0	
,, 17	62	,,	,,	,,	=4, 5+1	8·2	
,, 17	62	45	1	Bh.	2−4, 3+2	7·4	
,, 25	70	,,	,,	,,	=3	7·6	
,, 26	71	T.50	,,	Bn.	3−1, 4+4	7·7	
,, 28	73	60	2	Ga.	3−5, 4−2, =5	8·2	
,, 28	73	45	1	Bh.	3−1·5, 4+3	7·8	
,, 29	74	T.50	,,	Bn.	3−3·5, 4+2	7·9	
,, 31	76	60	,,	Ga.	4−3, 5−1, 6+3	8·4	
Sept. 2	78	40	,,	Bc.	4−1, 5+1	8·2	
,, 4	0380	45	,,	Bh.	4−1, 5+2	8·2	

(6044) S HERCULIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Sept. 5	0381	T.50	1	Bn.	5−1, 7+4·5	8·4	
,, 9	85	40	,,	Bc.	5−2, 6+3	8·5	
,, 10	86	45	,,	Bh.	5−2, 6+2	8·5	
,, 11	87	T.50	,,	Bn.	=5	8·3	
,, 15	91	90	2	Bh.	=5, =6	8·5	
,, 16	92	40	1	Bc.	5−5, =6	8·8	
,, 19	95	T.50	,,	Bn.	4−6, 7+1·5	8·7	
,, 23	0399	90	,,	Bh.	4−6, 7+2	8·7	
,, 24	0400	T.50	,,	Bn.	6−0·5, =7	8·8	
,, 26	02	40	,,	Bc.	=l, m+2	9·2	
,, 29	05	90	,,	Bh.	7−4, 8+8	9·3	
Oct. 4	10	45	,,	,,	6−7, 10+10·5	9·5	
,, 5	11	40	,,	Bc.	m−1, n+1	9·5	
,, 11	17	T.50	,,	Bn.	6−10, 7−9, 8+3, 9+2·5	9·8	
,, 11	17	60	2	Ga.	6−10, =9	9·9	
,, 19	25	,,	1	,,	=9, =11	10·2	
,, 19	25	90	,,	Bh.	6−10, 8+2, 10+5	9·9	
Nov. 3	40	,,	,,	,,	10+1	10·4	
,, 7	44	,,	,,	,,	10−1, 13+0·5	10·6	
,, 14	51	,,	2	,,	12−2, 13−2, 20+6	10·7	
,, 14	51	T.120	1	Bn.	13−3, 16+1	11·0	
,, 18	55	,,	,,	,,	13−4, 16+1	11·0	
,, 20	57	90	,,	Bh.	17−5, 18+5, =20, =22	11·4	
Dec. 1	68	,,	,,	,,	18+1, =20	11·6	
,, 5	72	T.120	,,	Bn.	17−6, 18+3	11·5	
,, 10	77	150	,,	Bh.	20−2, 18+2	11·6	
,, 21	88	,,	2	,,	=18, =20	11·6	
,, 23	90	,,	,,	,,	20−3, 18+1·5	11·7	
,, 31	0498	,,	1	,,	18−4, C+4	12·2	

(6512) T HERCULIS. (V. 3.)

H.D. 180531.

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Jan. 3	8675	240	2	Br.	31−9, 45+3	12·1	
Mar. 3	8734	45	,,	,,	6−4, 8+4	8·3	
,, 10	41	60	,,	,,	=6	7·8	
,, 20	51	45	1	,,	4−4, 6+2	7·6	
,, 31	8762	,,	,,	,,	=5, =6	8·0	

(6512) T HERCULIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Apr. 1	8763	T.50	1	Bn.	5−1·5, 7−1, 8+4	8·2	
„ 25	87	160	2	Br.	14−2, 22+2	9·6	
„ 29	91	p.40	1	Bn.	<14	<9·4	Not seen. p.=2″ O.G.
May 2	94	T.120	„	„	26−4, 29+1·5	10·8	
„ 7	8799	160	„	Br.	29−1, 31+1	11·1	
„ 13	8805	T.120	„	Bn.	34−4, 42+1·5	12·1	
„ 15	07	183	2	Ma.	34−2·5	11·9	
„ 18	10	160	1	Br.	34−3, 45+4	12·0	
„ 27	19	„	„	„	45−3, 54+6	12·7	
June 3	26	183	„	Ma.	45−2	12·6	
„ 13	36	160	„	Br.	45−7, 54+2	13·1	
„ 13	36	183	„	Ma.	=s, =t	13·1	
„ 26	49	„	„	„	31−10, t+5·5	12·5	
July 3	56	160	„	Br.	29−2, =31	11·2	
„ 4	57	79	2	Ma.	31+1	11·1	
„ 11	64	50	1	„	29+0·5	10·9	
„ 11	64	T.95	„	Bn.	26−4, 29+1·5	10·8	
„ 12	65	183	„	Ma.	29+1	10·9	
„ 22	75	.50	„	„	14−3, 22+1	9·7	
„ 25	78	„	„	„	14−3, 22+0·5	9·8	
„ 31	84	„	„	„	=14	9·4	
„ 31	84	60	„	Br.	8−5, 14+1	9·3	
Aug. 2	86	t.60	„	Bn.	13−2, 15+1	9·4	
„ 2	86	50	„	Ma.	14+1	9·3	
„ 4	88	„	„	„	6−14, 14+1	9·3	
„ 7	91	„	„	„	6−14, 14+2	9·2	
„ 8	92	45	„	Br.	8+1	8·6	
„ 10	94	50	„	Ma.	6−13, 14+3	9·1	
„ 10	94	t.60	„	Bn.	9−2, 8+1	8·6	
„ 12	8896	50	„	Ma.	6−5, 14+10	8·4	
„ 19	8903	„	2	„	6−4, 14+12	8·2	
„ 19	03	p.26	1	Bn.	6−2, 5+1	8·0	p.=2″ O.G.
„ 25	09	„	„	„	6−1, 5+2	7·9	„ „
„ 26	10	50	„	Ma.	6−1	7·9	
„ 29	13	t.30	2	Bn.	6−0·5, 5+2	7·9	
„ 30	14	„	1	„	6−0·5, 5+2	7·9	
„ 30	14	45	„	Br.	4−3, 6+3	7·5	
Sept. 1	16	t.30	„	Bn.	6−1, 5+2	7·9	
„ 3	18	„	„	„	6−1, 5+2	7·9	
„ 3	18	50	„	Ma.	6−1	7·9	
„ 8	23	t.30	„	Bn.	=5	8·1	
„ 9	24	45	„	Br.	4−5, =6	7·7	
„ 11	26	50	2	Ma.	6−1	7·9	
„ 11	26	t.30	1	Bn.	6−2, 5+0·5	8·0	
„ 16	31	45	„	Br.	6−4, 8+4	8·3	
„ 19	34	T.50	„	Bn.	5−4·5, 8+1, 9−1	8·5	
„ 20	35	t.30	„	„	9−2, 8+1	8·6	
„ 27	42	T.50	„	„	11−1, =12	9·0	
„ 29	8944	t.60	„	„	11−2, =13	9·1	

(6512) T HERCULIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Oct. 3	8948	t.75	1	Bn.	15−1, 18+1	9·7	
,, 6	51	t.100	,,	,,	26+0·5	10·4	
,, 9	54	160	2	Br.	22−5, 29+5	10·4	
,, 16	61	T.120	,,	Bn.	29−1	11·1	
Nov. 2	78	,,	,,	,,	42−1	12·3	
,, 6	82	160	1	Br.	34−5, 45+2	12·2	
,, 9	85	T.150	2	Bn.	45−3	12·7	
,, 20	96	,,	1	,,	45−6·5, 54+3	13·1	
,, 20	8996	160	,,	Br.	45−2	12·6	
,, 29	9005	,,	,,	,,	45−4, 54+5	12·8	
Dec. 9	15	,,	,,	,,	34−4, 45+4	12·0	
,, 18	24	T.95	,,	Bn.	29−1, =31	11·1	
,, 19	25	160	2	Br.	=29, 31+1	11·0	
,, 22	28	T.95	1	Bn.	26−4, 29+1·5	10·8	
,, 29	35	t.85	,,	,,	26−2, 29+3·5	10·6	
,, 30	36	160	2	Br.	=22	9·8	
1911.							
Jan. 6	43	45	1	F.G.B.	14−2, 22+1	9·7	
,, 6	43	t.60	,,	Bn.	15−1, =18	9·8	
,, 9	46	,,	,,	,,	13−2, 15+1	9·4	
,, 31	68	T.25	,,	,,	4+6	6·6	
Feb. 11	9079	,,	,,	,,	4+3	6·9	
Mar. 4	9100	T.50	,,	,,	5−3, 7−2, 8+3, =9	8·4	
,, 4	00	45	,,	Br.	6−4, 8+4	8·3	
,, 9	05	T.50	,,	Bn.	5−5, 8+1	8·6	
Apr. 3	30	160	,,	Br.	29−1, 31+1	11·1	
,, 18	45	,,	,,	,,	=45	12·4	
,, 19	46	66	,,	F.G.B.	=48	12·7	
,, 23	50	,,	,,	,,	48−2, 54+4	12·9	
,, 26	53	160	2	Br.	45−5	12·9	Doubtful.
,, 28	55	198	1	F.G.B.	=54	13·4	
,, 30	57	160	,,	Br.	45−3, 54+6	12·7	
May 4	61	T.167	,,	Bn.	45−8·5, 54+1	13·3	
,, 15	72	240	,,	Br.	=54	13·4	
,, 22	79	198	,,	F.G.B.	45−1, 48+2	12·5	
,, 24	81	T.120	,,	Bn.	45−2, 48+0·5	12·6	
,, 28	85	160	,,	Br.	34−4, 45+4	12·0	
,, 29	86	T.120	,,	Bn.	=42, 45+1	12·3	
June 1	89	,,	,,	,,	34−3·5, 42+2	12·0	
,, 3	91	66	,,	F.G.B.	31−1·5, 34+3	11·3	
,, 7	95	T.120	,,	Bn.	26−4, 29+1·5	10·8	
,, 8	9196	34	2	Cr.	=29	11·0	
,, 13	9201	T.120	1	Bn.	22−4, 26+1·5	10·2	
,, 17	05	66	,,	F.G.B.	=22	9·8	
,, 18	06	160	,,	Br.	=22	9·8	
,, 20	08	34	,,	Cr.	=22	9·8	
,, 27	9215	T.50	,,	Bn.	13−2, 15+2	9·4	

(6512) T HERCULIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
July 2	9220	45	1	F.G.B.	9−1, 13+6	8·5	
,, 10	28	,,	,,	,,	6−2, 7+0·5	8·0	
,, 10	28	T.50	,,	Bn.	=5	8·1	
,, 16	34	,,	,,	,,	4−5, 6+1·5	7·7	
,, 21	39	,,	,,	,,	=5	8·1	
,, 21	39	60	,,	Br.	4−1, 6+5	7·3	
,, 21	39	45	,,	F.G.B.	4−2, 6+4	7·4	
,, 23	41	B.	2	Gi.	=5	8·1	
,, 26	44	,,	,,	,,	6−2, 5+2	8·0	
,, 27	45	T.50	1	Bn.	4+1	7·1	
,, 31	49	,,	,,	,,	4−4·5, 6+2	7·6	
Aug. 1	50	45	,,	Br.	4−3, 6+3	7·5	
,, 3	52	50	,,	Gi.	=5	8·1	
,, 5	54	,,	,,	,,	=5	8·1	
,, 15	64	45	,,	F.G.B.	7−3, 8+3	8·4	
,, 16	65	40	2	Gi.	5−3, 14+2	8·8	
,, 17	66	,,	1	,,	8+2	8·5	
,, 24	73	45	,,	F.G.B.	8−4, 14+4	9·1	
,, 24	73	,,	,,	Br.	8−4, 14+4	9·1	
,, 25	74	40	2	Gi.	=l, 14+3·5	9·1	
,, 28	77	,,	1	,,	14+1	9·3	
Sept. 3	83	160	,,	Br.	14−3, 22+1	9·7	
,, 15	95	66	,,	F.G.B.	31−1·5, 34+3	11·3	
,, 17	97	160	,,	Br.	=31	11·2	
,, 18	9298	40	2	Gi.	22−2	10·0	Doubtful. [C.L.B.]
,, 24	9304	,,	1	,,	22−4	10·2	,, ,,
,, 26	06	T.120	,,	Bn.	45−1, 48+2	12·5	
Oct. 1	11	,,	,,	,,	42−4, 48+1	12·6	
,, 1	11	198	,,	F.G.B.	42−4·5, 48+1	12·6	
,, 10	20	160	2	Br.	<45	<12·4	Not seen.
,, 25	35	,,	1	,,	45−7, 54+2	13·1	
,, 26	36	132	,,	F.G.B.	52−2, 54+2	13·2	
,, 28	38	T.150	,,	Bn.	45−2, =48	12·7	
Nov. 8	49	160	,,	Br.	34−4, 45+4	12·0	
,, 9	50	132	,,	F.G.B.	34−5, 45+2·5	12·2	
,, 14	55	40	2	Gi.	29−2, 34+1	11·4	
,, 14	55	35	1	La.	22−10, 29+2	10·8	
,, 15	56	T.120	,,	Bn.	31−1, 34+3	11·3	
,, 17	58	160	,,	Br.	22−8, 29+2	10·7	
,, 19	60	35	2	La.	22−2·5, 29+9	10·1	
,, 21	62	40	1	Gi.	22−2, 29+1	10·4	
,, 24	65	35	3	La.	22−1	9·9	
,, 25	66	T.95	1	Bn.	22−1·5, 26+5	9·9	
,, 26	67	40	2	Gi.	=22	9·8	
,, 29	70	T.50	1	Bn.	15−0·5, 18+2	9·6	
,, 30	71	40	,,	Gi.	=14	9·4	
Dec. 1	72	160	2	Br.	14−1, 22+3	9·5	
,, 3	74	40	1	Gi.	l−1, 14+2	9·2	
,, 4	75	132	,,	F.G.B.	10−5, 14+1	9·4	
,, 7	78	T.50	,,	Bn.	8−1, =11	8·8	
,, 9	9380	,,	,,	,,	8−1, 11+0·5	8·8	

(6512) T HERCULIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
Dec. 9	9380	45	I	Br.	8−4, 14+4	9·1	
,, 12	83	,,	,,	F.G.B.	8−1·5, 14+6	8·8	
,, 15	86	T.50	,,	Bn.	5−4, 7−1, 8+2, 9+1	8·4	
,, 17	88	40	,,	Gi.	5−1, =9	8·3	
,, 20	91	45	,,	F.G.B.	=6	7·8	
,, 20	91	T.50	,,	Bn.	4−4·5, 6+2	7·6	
,, 22	93	25	,,	La.	6−2, 5+1	8·0	
,, 22	93	40	2	Gi.	6−1, 5+2	7·9	
,, 26	97	,,	I	,,	d−2, 6+1	7·7	
,, 28	9399	25	,,	La.	6−1, 5+1	8·0	
,, 31	9402	40	,,	Gi.	4−4, 6+2	7·6	
1912.							
Jan. 8	10	,,	2	,,	4−2, 6+3	7·4	
,, 10	12	,,	I	,,	4−3·5, 6+2	7·6	
,, 10	12	,,	2	La.	4−4, 6+2	7·6	
Feb. 15	48	,,	,,	,,	14−2, 22+1	9·7	
Mar. 6	68	160	,,	Br.	=34	11·7	About.
,, 7	69	132	I	F.G.B.	34−4, 45+4	12·0	
,, 15	77	40	2	Gi.	<29	<11·0	Not seen.
,, 19	9481	240	I	Br.	=54	13·4	About.
Apr. 7	9500	40	,,	La.	<34	<11·7	Not seen.
,, 16	09	240	,,	Br.	=54	13·4	About.
,, 16	09	132	2	F.G.B.	=45	12·4	
,, 22	15	40	,,	Gi.	=45	12·4	Glimpsed.
,, 26	19	,,	,,	,,	=45	12·4	
May 7	30	,,	,,	,,	=34	11·7	
,, 8	31	T.50	I	Bn.	29−1, =31	11·1	
,, 9	32	40	2	Gi.	29−4, 34+2	11·4	
,, 10	33	,,	,,	La.	=31	11·2	
,, 11	34	,,	,,	Gi.	=29	11·0	
,, 14	37	,,	,,	,,	22−4, 29+1	10·5	
,, 16	39	160	I	Br.	22−4, 29+6	10·3	
,, 16	39	132	,,	F.G.B.	=45, 48+2	12·5	Doubtful. [C.L.B.]
,, 20	43	,,	,,	,,	22−3, 25+3	10·2	
,, 20	43	40	,,	Gi.	=22	9·8	
,, 25	48	,,	,,	La.	14−1, 22+3	9·5	
June 2	56	45	,,	F.G.B.	8−2, 10+1	8·9	
,, 2	56	40	,,	La.	8−2, 10+2	8·8	
,, 2	56	,,	,,	Gi.	8−2, 10+1	8·9	
,, 3	57	T.50	,,	Bn.	9−1, 8+1	8·5	
,, 4	58	40	,,	La.	8−2, 10+2, 14+5	8·9	
,, 5	59	,,	,,	Gi.	7−6, 8+1	8·6	
,, 6	60	45	,,	Br.	8−3, 14+5	9·0	
,, 6	60	,,	,,	F.G.B.	6−8, 8+1	8·6	
,, 6	60	T.50	,,	Bn.	9−1, 8+2	8·5	
,, 8	62	40	2	La.	=8	8·7	
,, 8	62	,,	I	Gi.	7−3·5, 8+1	8·5	
,, 10	64	,,	,,	,,	7−5, 8+1·5	8·6	
,, 10	9564	T.50	,,	Bn.	9−2, 8+1	8·6	

(6512) T HERCULIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
June 13	9567	T.50	1	Bn.	9−2, 8+1	8·6	
,, 14	68	40	,,	Gi.	7−3, 8+2	8·4	
,, 17	71	,,	,,	,,	7−5, 8+2	8·5	
,, 18	72	45	,,	F.G.B.	=8	8·7	
,, 18	72	T.50	2	Bn.	8−2	8·9	
,, 20	74	,,	1	,,	=8, 11+1	8·7	
,, 23	77	,,	,,	,,	9−2, =8	8·6	
,, 23	77	60	,,	Br.	6−6, 8+2	8·5	
,, 25	79	40	,,	Gi.	7−5, 8+2	8·5	
,, 28	82	T.50	,,	Bn.	8−1, 11+0·5	8·8	
July 4	88	40	,,	Gi.	=8	8·7	
,, 5	89	T.50	,,	Bn.	8−1, =11	8·8	
,, 6	90	40	,,	La.	10−1, 14+4	9·0	
,, 8	92	,,	2	Gi.	8−2, 10−1, l+2	9·0	
,, 12	96	,,	,,	,,	10−2, l+2	9·0	
,, 13	97	T.50	1	Bn.	13−2, 15+1	9·4	
,, 14	98	40	2	La.	=14	9·4	
,, 15	9599	T.50	1	Bn.	13−2, 15+1	9·4	
,, 16	9600	40	,,	La.	14−1, 22+3	9·5	
,, 17	01	,,	2	Gi.	l−4, 14+2	9·4	
,, 18	02	,,	1	La.	14−2, 22+2	9·6	
,, 22	06	,,	,,	,,	14−2, 22+2	9·6	
,, 26	10	,,	,,	,,	22−1	9·9	
,, 31	15	,,	2	,,	29+4	10·6	Difficult.
Aug. 1	16	,,	,,	Gi.	22−4, 29+1	10·5	
,, 2	17	160	1	Br.	22−4, 29+7	10·2	
,, 5	20	40	,,	La.	29−1, 31+1	11·1	
,, 9	24	,,	,,	,,	31−1	11·3	
,, 10	25	,,	2	Gi.	29−4, 34+2	11·4	
,, 12	27	,,	1	La.	31−1, 34+4	11·3	
,, 17	32	,,	2	Gi.	=34	11·7	
Sept. 2	48	160	1	Br.	34−4, 45+4	12·0	
,, 2	48	T.120	2	Bn.	=48	12·7	About.
,, 5	51	40	,,	La.	34−2	11·9	
,, 18	64	160	1	Br.	45+1	12·3	
,, 18	64	40	2	Gi.	=45	12·4	
,, 20	66	T.120	,,	Bn.	45−2, 48+1	12·6	
Oct. 2	78	,,	1	,,	34−1	11·8	
,, 2	78	40	2	Gi.	=34	11·7	
,, 5	81	T.120	1	Bn.	34−2	11·9	
,, 8	84	,,	,,	,,	34−1, 42+5	11·7	
,, 10	86	,,	,,	,,	34+0·5	11·6	
,, 10	86	160	,,	Br.	29+1	10·9	
,, 10	86	40	2	Gi.	=29	11·0	
,, 20	9696	,,	,,	,,	14−2, 22+2	9·6	
,, 29	9705	160	1	Br.	14+1	9·3	
Nov. 1	08	T.50	,,	Bn.	8−1, =11	8·8	
,, 1	08	40	,,	Gi.	10−2, l+2	9·0	
,, 3	10	T.50	,,	Bn.	8−1, 11+0·5	8·8	
,, 4	11	40	2	Gi.	=10	8·9	
,, 9	9716	45	1	Br.	=8	8·7	

(6512) T HERCULIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Nov. 13	9720	T.50	1	Bn.	5−4, 7−1, 8+2, 9+2	8·3	
„ 18	25	45	„	Br.	6−1	7·9	
„ 24	31	40	2	Gi.	6−2, =5	8·1	
„ 25	32	„	„	„	6−2, =5, 7+2	8·0	
„ 27	34	T.50	1	Bn.	6−2, 5+1, 7+1	8·0	
„ 30	37	„	„	„	6−1, 5+2	7·9	
Dec. 3	40	20	„	La.	=5	8·1	
„ 3	40	40	2	Gi.	5−2, 8+3·5	8·3	
„ 4	41	45	1	Br.	6−2	8·0	
„ 5	42	20	„	La.	5−2, 9+1	8·3	
„ 6	43	„	2	„	=9	8·4	
„ 7	44	40	1	Gi.	5−3, 8+3	8·4	
„ 8	45	20	„	La.	9−2, 8+1	8·6	
„ 9	46	„	„	„	9−1, 8+2	8·5	
„ 12	49	T.50	„	Bn.	=8, 11+1	8·7	
„ 16	53	„	„	„	8−1, 11+1	8·8	
„ 18	55	„	„	„	=8, 11+1	8·7	
„ 18	55	45	2	Br.	8+1	8·6	
„ 20	57	40	„	Gi.	=8	8·7	
„ 28	65	45	1	Br.	8−4, 14+4	9·1	
„ 29	66	T.50	2	Bn.	13−2, 15+2	9·4	
„ 30	67	„	1	„	13−3, 15+1	9·5	
1913.							
Jan. 3	71	40	2	Gi.	14−3, 22+2	9·7	
„ 25	9793	160	„	Br.	<29	<11·0	Not seen.
Feb. 3	9802	40	„	Gi.	<45	<12·4	Glimpsed.
„ 13	12	„	„	La.	<37	<11·8	
„ 26	25	160	„	Br.	<34	<11·7	Not seen.
Mar. 1	28	40	1	La.	<45	<12·4	Perhaps glimpsed.
„ 11	38	20	2	„	=34	11·7	Difficult.
Apr. 6	64	40	„	„	=29	11·0	
„ 14	72	„	„	„	14+1	9·3	
„ 15	73	20	1	„	10−3, 14+1	9·3	
„ 25	83	45	„	Br.	8−1	8·8	
„ 28	86	20	„	La.	6−6, 8+2	8·5	
„ 30	88	„	„	„	6−3, 8+6	8·1	
May 1	89	T.50	„	Bn.	5−5, 7−2, 8+1, 9+0·5	8·5	
„ 5	93	20	„	La.	7−2, 9+1	8·3	
„ 6	94	„	„	„	7−3, =9	8·4	
„ 6	94	T.50	„	Bn.	7−2, 9+1	8·3	
„ 6	94	50	„	Ma.	=8	8·7	
„ 9	97	45	„	Br.	6−4, 8+4	8·3	
„ 9	97	20	„	La.	7−1, 9+1	8·2	
„ 10	98	T.50	„	Bn.	5−1, =7	8·1	
„ 10	9898	40	„	Gi.	5−3·5, 9+2	8·3	
„ 13	9901	50	„	Ma.	4−12, 8+4	8·3	
„ 13	01	T.50	„	Bn.	5−1, 7−1	8·2	
„ 16	9904	„	„	„	5−1·5, 7−1	8·2	

(6512) T HERCULIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
May 18	9906	40	I	Gi.	5−2, 9+3	8·2	
,, 20	08	,,	2	La.	=7	8·1	
,, 21	09	,,	I	,,	6−4, =7	8·2	
,, 24	12	,,	,,	,,	=7	8·1	
,, 24	12	T.50	,,	Bn.	5−1, 8+5	8·2	
,, 24	12	50	,,	Ma.	4−13, 8+2	8·5	
,, 25	13	45	,,	Br.	6−2, 8+6	8·1	
,, 25	13	40	,,	Gi.	5−2, 9+2	8·2	
,, 25	13	34	,,	Cr.	=6	7·8	
,, 26	14	50	,,	Ma.	=8	8·7	
,, 27	15	T.50	,,	Bn.	5−4, 7−2, 8+2, 9+1	8·4	
,, 27	15	40	,,	La.	7−1, 9+1	8·2	
,, 29	17	20	,,	,,	7−1, 9+1	8·2	
,, 29	17	40	,,	Gi.	5−3, 9+2	8·3	
,, 31	19	34	,,	Cr.	=6	7·8	
,, 31	19	50	,,	Ma.	=8	8·7	
June 1	20	40	,,	Gi.	5−3, 9+1	8·3	
,, 2	21	T.50	,,	Bn.	5−3, 8+3	8·4	
,, 2	21	34	,,	Cr.	6−5, 8+3	8·4	
,, 3	22	T.50	,,	Bn.	5−4, =7, 8+1·5	8·4	
,, 5	24	20	2	La.	7−3, 9−1, 8+1	8·5	
,, 7	26	45	I	Br.	=8	8·7	
,, 7	26	T.50	,,	Bn.	5−4, 7−2, 8+1, 9+1	8·4	
,, 7	26	34	,,	Cr.	=9	8·4	
,, 8	27	40	,,	Gi.	9−0·5, 8+1	8·5	
,, 10	29	,,	,,	La.	8−2, 10+1	8·9	
,, 10	29	50	,,	Ma.	14+3	9·1	
,, 14	33	40	,,	La.	8−5, 10−1, 14+4	9·1	
,, 15	34	50	,,	Ma.	8−4, 19+8	9·1	
,, 21	40	40	,,	La.	14−3, 22+1	9·7	
,, 27	46	T.95	,,	Bn.	22−4, 26+2	10·2	
,, 27	46	79	,,	Ma.	22+1, 29+3	10·2	
July 2	51	150	,,	Ch.	=29	11·0	
,, 7	56	,,	2	,,	=31	11·2	
,, 11	60	T.120	I	Bn.	34−1	11·8	
,, 11	60	79	,,	Ma.	29−2, =31	11·2	
,, 20	69	150	2	Ch.	29−6, 36+3	11·5	
,, 24	73	T.150	I	Bn.	45−2, 48+1	12·6	
,, 24	73	79	,,	Ma.	31−3, 34+1·5	11·5	
,, 28	77	150	,,	Ch.	=45	12·4	
,, 30	79	T.167	,,	Bn.	45−2, =48	12·7	
,, 31	80	183	2	Ma.	37+2	11·6	
Aug. 2	82	160	I	Br.	45−2, 52+5	12·6	
,, 5	9985	79	2	Ma.	=45	12·4	About.
,, 24	0004	160	I	Br.	34−2, 45+6	11·8	
Sept. 3	14	183	,,	Ma.	=29	11·0	
,, 6	17	79	,,	,,	29+1	10·9	
,, 6	17	T.120	,,	Bn.	29+0·5	10·9	
,, 7	18	160	,,	Br.	22−5, 29+5	10·4	
,, 12	23	79	2	Ma.	22+1, 29+2	10·2	
,, 16	27	,,	,,	,,	=14	9·4	
,, 24	0035	50	I	,,	8−9, 19+3	9·6	

(6512) T HERCULIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Sept. 24	0035	45	1	Br.	14+1	9·3	
„ 24	35	T.50	„	Bn.	13−1, 15+3	9·3	
„ 24	35	40	„	La.	10−2, 14+2	9·2	
„ 26	37	79	„	Ma.	14+1	9·3	
„ 28	39	T.50	„	Bn.	8−1, 11+0·5	8·8	
Oct. 11	52	79	„	Ma.	6−1·5	8·0	
„ 19	60	45	„	Br.	4−1, 6+4	7·3	
„ 21	62	20	„	La.	4−4, =6	7·7	
„ 22	63	T.50	„	Bn.	6−2, 5+0·5	8·0	
„ 23	64	50	„	Ma.	4−6, 6+1	7·7	
„ 25	66	20	„	La.	4−3, =6	7·6	
„ 31	72	„	„	„	4−3, =6, 9+5	7·7	
„ 31	72	160	„	Br.	=4	7·2	
Nov. 1	73	T.50	„	Bn.	4−4·5, 6+2	7·6	
„ 1	73	50	„	Ma.	4−6, 6+2	7·7	
„ 5	77	„	„	„	4−4, 6+2·5	7·6	
„ 15	87	40	„	La.	6−2, 9+4	8·0	
„ 18	90	20	„	„	6−4, =9	8·3	
„ 22	94	45	„	Br.	6−5, 8+1	8·5	
„ 22	94	T.50	„	Bn.	5−5, 7−1, 8+1, 9+2	8·4	
„ 26	0098	40	„	La.	9−4, 8+1, 10+4	8·6	
„ 28	0100	„	„	„	8−2, 10+2	8·8	
Dec. 1	03	„	„	„	10−3, 14+2	9·2	
„ 4	06	45	„	Br.	8−2, 14+5	8·9	
„ 8	10	40	„	La.	14−1, 22+3	9·5	
„ 11	13	„	„	„	14−1, 22+3	9·5	
„ 14	16	T.95	„	Bn.	=22	9·8	
„ 18	20	T.120	„	„	26−4, 29+2	10·8	
„ 21	23	40	2	La.	22−3, =26	10·3	
„ 24	26	160	1	Br.	=29	11·0	
„ 28	30	T.120	„	Bn.	31−4, 34+1	11·6	
„ 31	33	„	„	„	31−4, =34	11·6	
1914.							
Jan. 2	35	120	2	Br.	=34	11·7	About.
„ 6	39	T.150	1	Bn.	45−2	12·6	
„ 23	56	40	„	La.	<34	<11·7	
Feb. 4	68	T.120	„	Bn.	48−1, 54+5·5	12·8	
„ 28	0192	T.50	„	„	=13	9·2	
Mar. 16	0208	45	2	Br.	=8	8·7	About.
„ 21	13	„	1	„	6−3, 8+5	8·2	
„ 27	19	„	2	„	=6	7·8	
Apr. 15	38	„	1	„	4−2, 6+5	7·3	
„ 15	38	p.16	„	Bn.	4−1	7·3	p=2″ O.G.
„ 16	39	20	„	La.	4−4, 6+2	7·6	
„ 22	45	„	„	„	=6	7·8	
„ 26	49	45	„	Br.	=6	7·8	
„ 27	0250	T.50	„	Bn.	5+1	8·0	

(6512) T HERCULIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Apr. 28	0251	t.30	1	Bn.	5−1, =7, 8+5	8·2	
,, 28	51	20	,,	La.	=5, 6−2	8·1	
May 2	55	,,	,,	,,	5−3, 6−4, 9+3	8·2	
,, 16	69	45	,,	Br.	=14	9·4	
,, 16	69	T.50	,,	Bn.	13−1, 15+3	9·3	
,, 17	70	34	,,	Cr.	14+2	9·2	
,, 17	70	64	,,	Ad.	14−1, 22+2	9·6	
,, 19	72	,,	2	,,	=14	9·4	
,, 21	74	,,	,,	,,	14−2, 22+1	9·7	
,, 21	74	T.50	1	Bn.	13−3, 15+1	9·5	
,, 21	74	40	,,	La.	14−1, 22+3	9·5	
,, 24	77	,,	2	,,	22−3, =26, 29+4	10·4	
,, 24	77	64	1	Ad.	14−1, 22+2	9·6	
,, 25	78	T.50	,,	Bn.	22−4, 26+2	10·2	
,, 26	79	64	,,	Ad.	=22	9·8	
,, 26	79	160	,,	Br.	22−6, 29+6	10·4	
,, 29	82	40	,,	La.	26−4, 29+2	10·8	
June 11	95	,,	2	,,	34−5, 45+2	12·2	
,, 13	97	64	,,	Ad.	=34	11·7	
,, 13	0297	160	1	Br.	34−6, 45+2	12·2	
,, 16	0300	40	2	La.	=45	12·4	
,, 17	01	T.167	1	Bn.	45−2, 48+1	12·6	
,, 19	03	40	2	La.	=45	12·4	
,, 25	09	160	1	Br.	45−5, 54+5	12·9	
,, 25	09	40	2	La.	45−2	12·6	
,, 29	13	T.200	1	Bn.	54−1	13·5	
,, 29	13	183	,,	Ma.	=t	13·3	
July 14	28	40	,,	La.	<45	<12·4	
,, 17	31	140	2	Ch.	54−1	13·5	
,, 23	37	183	,,	Ma.	=t	13·3	
,, 28	42	40	3	La.	=45	12·4	
Aug. 3	48	160	1	Br.	=45	12·4	
,, 10	55	150	,,	Ad.	=34	11·7	
,, 10	55	40	3	La.	29−8, =34	11·7	
,, 11	56	240	1	Ad.	31−1, 34+3	11·3	
,, 13	58	75	,,	Ch.	=31	11·2	
,, 16	61	150	,,	Ad.	31−1, 34+3	11·3	
,, 18	63	40	,,	La.	=29	11·0	
,, 21	66	160	,,	Br.	22−4, 29+8	10·2	
,, 23	68	150	2	Ad.	=29	11·0	
,, 23	68	75	,,	Ch.	31+1	11·1	
,, 25	70	40	,,	La.	22−1, 29+5	10·2	
,, 27	72	T.95	,,	Bn.	22−4·5, 26+1	10·3	
,, 29	74	,,	,,	,,	22−4, 26+2	10·2	
,, 30	75	80	,,	Ad.	22−6, =26, 29+6	10·4	
Sept. 1	77	40	1	Bc.	=14, 22+4	9·4	
,, 3	79	,,	,,	La.	=14, 22+4	9·4	
,, 5	81	75	2	Ch.	=12	9·1	
,, 10	86	45	1	Br.	8−2, 14+5	8·9	
,, 10	86	40	,,	Bc.	8−3, 14+4	9·0	
,, 11	0387	25	2	Ad.	=8	8·7	

(6512) T HERCULIS—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914,							
Sept. 11	0387	T.50	1	Bn.	=8, 11+1	8·7	
,, 15	91	20	,,	La.	6−6, 8+3	8·4	
,, 16	92	40	,,	Bc.	9−2, 8+1	8·6	
,, 19	95	17	,,	Ad.	9−1, 8+1	8·5	
,, 19	95	75	,,	Ch.	=11	8·9	
,, 19	95	T.50	,,	Bn.	9−1, 8+1	8·5	
,, 23	99	75	,,	Ch.	9+1	8·3	
,, 23	0399	45	,,	Br.	6−3, 8+5	8·2	
,, 24	0400	25	,,	Ad.	9−1, 8+2	8·5	
,, 24	00	T.50	,,	Bn.	=9	8·4	
,, 27	03	25	2	Ad.	=9	8·4	
,, 27	03	40	1	Bc.	5−3, =9	8·4	
Oct. 5	11	,,	,,	,,	14−1, 22+3	9·5	Doubtful. [C.L.B.]
,, 5	11	20	,,	La.	6−5, =9	8·4	
,, 11	17	25	,,	Ad.	=8	8·7	
,, 11	17	T.50	,,	Bn.	5−4, 7−2, 8+1·5, 9+1	8·4	
,, 12	18	60	2	Br.	8+2	8·5	
,, 17	23	25	,,	Ad.	8−1, 10+1	8·8	
,, 18	24	T.50	1	Bn.	8−1, 11+0·5	8·8	
,, 21	27	20	,,	La.	=10, 1+3	8·9	
,, 24	30	75	2	Ch.	11−1, 12+1	9·0	
Nov. 7	44	80	1	Br.	22−8, 29+2	10·7	
,, 7	44	40	,,	Bc.	14−4, =22	9·8	Doubtful. [C.L.B.]
,, 9	46	,,	,,	La.	26−6, =29, 34+4	11·1	
,, 14	51	64	,,	Ad.	=31	11·2	
,, 16	53	T.120	,,	Bn.	29−1, =31	11·1	
,, 17	54	40	2	La.	29−6, =34	11·6	
,, 17	54	80	,,	Ad.	=34	11·7	
,, 27	64	160	1	Br.	34−4, 45+4	12·0	
Dec. 5	72	T.150	,,	Bn.	45−2, 48+1	12·6	
,, 16	83	T.120	2	,,	48−2	12·9	Uncertain.
,, 16	83	140	,,	Ch.	45−5, 54+5	12·9	
,, 16	83	120	1	Br.	45−6, 54+4	13·0	
,, 31	0498	160	,,	,,	<34	<11·7	Not seen.

(6849) R AQUILÆ. (V. 1.)

H.D. 190108.

NOTES.

A = D.M. + 8° 3956, 7·26 m. estimated.
D = ,, + 7° 3987, 7·39 m. P.D.M.
F = ,, + 6° 4014, 6·88 m. ,,
H = F62 Serpentis, 5·65 m. ,,

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Feb. 12	8715	T.94	2	Ni.	23−1·5, 30+3	11·3	
,, 21	24	,,	1	,,	23−1·5, 30+3	11·3	
Mar. 14	45	,,	,,	,,	=23	11·1	
,, 16	47	,,	,,	,,	=23	11·1	
,, 26	57	,,	,,	,,	13−7, 23+9	10·2	
Apr. 10	72	,,	,,	,,	7−5, 13+1	9·4	
,, 24	86	,,	,,	,,	7−3, 13+3	9·2	
May 3	95	,,	,,	,,	5−3, 7+2	8·6	Orange. In t.22, 9·3.
,, 6	8798	T.50	,,	Bn.	7−1, =8	8·9	
,, 12	8804	t.60	,,	,,	5−1, 6+1	8·4	
,, 12	04	t.22	,,	Ni.	5−3, 7+2	8·6	Orange yellow.
,, 15	07	T.50	,,	Bn.	=3	7·9	
,, 22	14	t.30	,,	,,	2−2·5, 3+5	7·4	
,, 23	15	t.22	,,	Ni.	D−3, 5+6·5	7·7	Orange yellow.
June 3	26	,,	,,	,,	1−5·5, F+2	6·7	Orange yellow.
,, 3	26	50	,,	Ma.	=A	7·3	Pale pink red.
,, 3	26	t.30	,,	Bn.	1−5, 2+5	6·6	
,, 8	31	,,	,,	,,	1−1·5, 2+9	6·3	
,, 9	32	t.22	,,	Ni.	1−3, F+5	6·4	Orange yellow.
,, 13	36	50	,,	Ma.	1−3, A+9	6·4	Pale pink red.
,, 14	37	t.30	,,	Bn.	1+1	6·0	
,, 17	40	50	,,	Ma.	1+2·5	5·9	
,, 18	41	T.25	,,	Bn.	1+1	6·0	
,, 19	42	t.30	,,	,,	1+2	5·9	In B. 5·9.
,, 22	45	50	2	Ma.	1+3	5·8	
,, 26	49	,,	1	,,	1+1	6·0	
,, 26	49	t.22	2	Ni.	H−3, 1+1·5	6·0	
,, 28	51	T.25	1	Bn.	1+2	5·9	In B. 5·9.
July 4	57	50	2	Ma.	1−9, A+2·5	7·0	Doubtful. [C.L.B.]
,, 7	60	t.22	1	Ni.	H−2, 1+2	5·9	Orange yellow.
,, 11	64	50	,,	Ma.	1−8, A+3·5	6·9	
,, 12	65	,,	,,	,,	1−6, A+6	6·7	
,, 12	65	t.30	,,	Bn.	1+1	6·0	
,, 13	66	,,	,,	,,	1−1·5	6·3	
,, 16	69	t.22	2	Ni.	H−2, 1+2	5·9	
,, 22	75	t.30	1	Bn.	1−3	6·4	
,, 22	75	50	,,	Ma.	1−10, A+1·5	7·1	Pale red.
,, 25	8878	,,	,,	,,	1−9, A+3	7·0	Red.

(6849) R AQUILÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
July 25	8878	t.30	1	Bn.	1−2, 2+8·5	6·3	
,, 28	81	t.22	,,	Ni.	1−4, F+4	6·5	
,, 29	82	t.30	2	Bn.	1−3·5, 2+7	6·5	
,, 31	84	50	1	Ma.	1−10·5, A+1	7·2	
Aug. 2	86	,,	,,	,,	1−10·5, A+1	7·2	
,, 2	86	t.22	,,	Ni.	F−2, D+3	7·1	
,, 6	90	t.30	,,	Bn.	1−8, 2+2·5	6·9	
,, 6	90	50	2	Ma.	1−10, A+1·5	7·1	
,, 10	94	,,	1	,,	A+1	7·2	Red.
,, 10	94	t.30	,,	Bn.	1−9·5, 2+1, A+4	7·0	
,, 12	96	50	,,	Ma.	=A	7·3	About.
,, 13	97	t.22	,,	Ni.	D−2, 5+7	7·6	
,, 15	8899	50	,,	Ma.	A−1·5	7·4	
,, 19	8903	,,	2	,,	A−1, 3+5	7·4	
,, 19	03	p.16	1	Bn.	=2	7·2	p=2″ O.G.
,, 22	06	t.22	,,	Ni.	D−4, 5+5	7·8	
,, 25	09	p.26	,,	Bn.	A−4, 3+1	7·7	p=2″ O.G.
,, 26	10	50	,,	Ma.	3+2, 4+1	7·8	Very red.
,, 29	13	t.30	2	Bn.	2−5, 3+1	7·7	
,, 30	14	,,	1	,,	A−4, 3+1	7·7	
Sept. 1	16	,,	,,	,,	A−4, 3+1	7·7	
,, 3	18	,,	,,	,,	A−4·5, 3+1	7·7	
,, 3	18	50	,,	Ma.	A−5, =3	7·8	
,, 8	23	t.30	,,	Bn.	3+2	7·7	
,, 11	26	t.60	,,	,,	3+1	7·8	
,, 11	26	50	2	Ma.	=3, =4	7·9	About.
,, 19	34	T.50	1	Bn.	=3, 4+0·5	7·9	
,, 21	36	t.22	,,	Ni.	5−2, 7+3·5	8·5	In T.94, 8·1. Yellowish orange.
,, 27	42	T.50	,,	Bn.	=5, 6+1	8·4	
,, 29	44	t.60	,,	,,	5−1, =6	8·5	
,, 30	45	t.22	,,	Ni.	5−5, 7+1	8·8	
Oct. 3	48	t.75	2	Bn.	6−1	8·6	
,, 13	58	T.94	1	Ni.	=7	8·9	
,, 16	61	T.50	,,	Bn.	7−3, 11+1·5	9·1	
,, 23	68	T.94	,,	Ni.	7−3, 13+3	9·2	
Nov. 1	77	t.75	,,	Bn.	15−2, 21+5·5	10·3	
,, 2	78	T.50	,,	,,	15−2·5, 21+5	10·4	
,, 5	81	T.94	,,	Ni.	13−3, 23+14	9·8	
,, 9	85	T.50	,,	Bn.	15−5, 21+2·5	10·6	
,, 16	92	T.95	,,	,,	21+1	10·8	
,, 20	96	T.120	,,	,,	21−1, 23+2	11·0	
,, 21	8997	T.94	,,	Ni.	13−11, 23+5	10·6	
Dec. 8	9014	,,	2	,,	23−2, 30+1	11·4	
,, 14	20	,,	,,	,,	23−2, 30+1	11·4	
,, 18	24	,,	1	,,	23−3, 30+1·5	11·4	
,, 18	24	T.95	2	Bn.	23−3, 30+1	11·5	
,, 22	28	T.70	,,	,,	23−3, 30+1·5	11·4	
,, 28	9034	T.94	,,	Ni.	23−4, 30+0·5	11·5	

(6849) R AQUILÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
Jan. 31	9068	T.50	1	Bn.	30−1·5	11·7	
Feb. 25	9093	T.94	,,	Ni.	13−12, 23+4	10·7	
Mar. 4	9100	T.120	,,	Bn.	23−1, 30+3·5	11·2	
,, 9	05	,,	,,	,,	21−1·5, 23+1	11·0	
,, 19	15	T.94	,,	Ni.	13−8, 23+8	10·3	
,, 31	27	,,	,,	,,	=7	8·9	In t.22, 9·5.
Apr. 6	33	,,	,,	,,	=5	8·3	In t.22, 8·7.
,, 17	44	t.22	,,	,,	D−4·5, 5+5	7·8	
,, 23	50	t.30	,,	Bn.	2−5, 3+1	7·7	
May 2	59	T.25	,,	,,	1−9, 2+1·5	7·0	
,, 4	61	t.22	,,	Ni.	F−3, D+1·5	7·2	Yellowish orange.
,, 15	72	,,	,,	,,	1−8, D+4·5	6·9	
,, 22	79	T.25	,,	Bn.	1−1·5, 2+9	6·3	
,, 24	81	t.30	,,	,,	1−2·5, 2+8	6·4	
,, 25	82	t.22	,,	Ni.	1−6, F+1·5	6·7	
,, 29	86	t.30	,,	Bn.	1−2·5, 2+8	6·4	
June 1	89	,,	,,	,,	1−2, 2+8·5	6·3	
,, 4	92	t.22	,,	Ni.	1−6·5, F+1	6·8	
,, 6	9194	t.30	,,	Bn.	1−1	6·2	
,, 13	9201	T.25	,,	,,	1−2·5, 2+8	6·4	
,, 16	04	90	2	Bh.	=1	6·1	
,, 18	06	t.22	1	Ni.	1−7, F+1	6·8	
,, 18	06	t.30	,,	Bn.	1−3·5, 2+7	6·5	
,, 27	15	,,	,,	,,	1−6, 2+4	6·7	
July 2	20	,,	,,	,,	1−9, 2+2	7·0	
,, 3	21	t.22	,,	Ni.	D−1·5, 5+7	7·6	
,, 5	23	t.30	,,	Bn.	1−9·5, 2+1	7·1	
,, 10	28	,,	,,	,,	2−1	7·3	
,, 10	28	t.22	,,	Ni.	D−3·5, 5+5	7·8	
,, 12	30	90	2	Bh.	=2	7·2	
,, 16	34	t.30	1	Bn.	2−5, 3+2	7·7	
,, 19	37	30	,,	Go.	2−3, 3+3	7·5	
,, 20	38	90	2	Bh.	2−3, 3+3	7·5	
,, 21	39	T.50	1	Bn.	3+3	7·6	
,, 22	40	60	,,	Go.	4−2, 5+2	8·1	
,, 25	43	t.22	,,	Ni.	5+1	8·2	
,, 26	44	30	,,	Go.	4−3, 6+3	8·2	
,, 27	45	T.50	,,	Bn.	3+2·5, 4+3	7·6	
,, 30	48	60	,,	Go.	=5	8·3	
,, 30	48	90	2	Bh.	=6	8·5	
,, 31	49	T.50	1	Bn.	3+1	7·8	
Aug. 3	52	60	2	Go.	4−3, 5+1	8·2	
,, 6	55	t.22	1	Ni.	5−1, 7+4	8·4	
,, 12	61	30	,,	Go.	6−1, 8+2	8·6	
,, 15	64	57	2	Bh.	=11	9·3	
,, 17	66	t.22	1	Ni.	5−4, 7+1	8·7	
,, 18	9267	60	,,	Go.	6−3, 8+1	8·8	

(6849) R AQUILÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
Aug. 25	9274	60	1	Go.	=7	8·9	
,, 27	76	T.94	,,	Ni.	7−3, 13+3	9·2	In t.22, 9·5.
,, 30	79	60	,,	Go.	=13	9·5	
Sept. 1	81	30	2	,,	13−1, 14+4	9·6	
,, 10	90	60	,,	,,	13−5, 18+5	10·0	
,, 15	95	,,	1	,,	13−8, 18+2	10·3	
,, 17	9297	,,	,,	,,	17−2, 22+2	10·7	
,, 21	9301	,,	2	,,	22−1, 23+1	11·0	
,, 22	02	T.94	1	Ni.	13−5, 23+12	10·0	In t.22, 10·7.
,, 23	03	60	,,	Go.	21−0·5, 23+2	10·9	
,, 26	06	,,	,,	,,	21−1·5, 23+1	11·0	
,, 26	06	T.95	,,	Bn.	15−5·5, 21+2	10·7	
,, 28	08	60	,,	Go.	21−2, 23+0·5	11·1	
,, 29	09	T.94	,,	Ni.	13−8, 23+8	10·3	In t.22, 10·7.
Oct. 2	12	60	,,	Go.	=23	11·1	
,, 9	19	,,	,,	,,	=23	11·1	
,, 9	19	T.94	,,	Ni.	13−9, 23+7	10·4	Reddish orange.
,, 11	21	60	,,	Go.	23−1, 24+1	11·3	
,, 25	35	,,	,,	,,	23−1, 24+1	11·3	
,, 26	36	T.94	,,	Ni.	13−15, 23+2	11·0	
,, 28	38	T.120	,,	Bn.	23−3, 30+1·5	11·4	
,, 30	40	90	2	Bh.	=23	11·1	
Nov. 5	46	T.94	1	Ni.	23−2, 30+2	11·4	
,, 9	50	T.120	,,	Bn.	23−3, 30+1	11·5	
,, 15	56	,,	,,	,,	23−3, 30+1	11·5	
,, 21	62	T.94	,,	Ni.	23−2·5, 30+2	11·4	
,, 24	65	150	2	Bh.	25−4, 35+4	11·8	
,, 25	66	T.120	,,	Bn.	23−3, 30+1	11·5	
,, 29	70	,,	1	,,	23−3, 30+1·5	11·4	
,, 29	70	57	2	Bh.	26−2, 32+2	11·8	
Dec. 3	74	160	1	Br.	23−1, 30+3	11·3	
,, 4	75	90	2	Bh.	30−2, 32+2	11·8	
,, 8	79	T.94	1	Ni.	23−2, 30+2	11·4	
,, 9	80	T.120	,,	Bn.	23−3, 30+1·5	11·4	
,, 10	81	150	2	Bh.	23−5, =30, 35+5	11·6	
,, 13	84	,,	,,	,,	30−2, 32+2	11·8	
,, 20	9391	T.150	1	Bn.	23−1·5, 30+3	11·3	
1912.							
Jan. 4	9406	90	2	Bh.	=17	10·5	
,, 15	17	57	,,	,,	=12, =13	9·5	
,, 27	29	T.94	,,	Ni.	=13	9·5	
,, 29	31	57	,,	Bh.	11−1, 12+1	9·4	
Feb. 11	44	T.94	,,	Ni.	5−3, 7+3	8·6	In t.22, 8·6.
,, 14	47	57	,,	Bh.	6−4, 11+4	8·9	
,, 21	54	,,	,,	,,	2−6, =4, 5+6	7·8	
,, 21	54	T.94	,,	Ni.	=5	8·3	
,, 25	58	t.22	,,	,,	D−7, 5+2	8·1	
,, 26	9459	57	,,	Bh.	2−4, 3+2	7·6	In F. 7·2.

(6849) R AQUILÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Mar. 3	9465	t.22	1	Ni.	=D	7·4	
" 7	69	"	"	"	=F	6·9	
" 8	70	"	"	"	F−2, D+2	7·1	
" 9	71	57	"	Bh.	1−3·5, 3+14	6·5	Pale orange.
" 16	78	"	"	"	=1	6·1	Orange red.
" 19	81	"	2	"	1+1	6·0	Orange.
" 19	81	t.22	1	Ni.	1−4·5, F+3	6·6	Yellowish orange.
" 23	85	57	2	Bh.	=1	6·1	
" 27	89	"	"	"	1+2	5·9	
" 28	9490	t.22	1	Ni.	1+2	5·9	
Apr. 9	9502	45	"	Bh.	1+1	6·0	Yellow.
" 11	04	"	"	"	1+2	5·9	"
" 11	04	t.22	2	Ni.	1+2·5	5·9	Orange yellow.
" 12	05	45	1	Bh.	=1	6·1	Orange.
" 17	10	"	2	"	=1	6·1	
" 20	13	"	"	"	1+1	6·0	Dull orange.
" 20	13	t.22	1	Ni.	=1	6·1	Orange yellow.
" 23	16	45	2	Bh.	1+0·5	6·1	
" 25	18	"	"	"	=1	6·1	Dull orange.
" 26	19	"	"	"	1−1·5	6·3	
" 26	19	t.22	1	Ni.	1+1	6·0	
May 6	28	45	2	Bh.	=2	7·2	Pale yellow.
" 10	33	t.22	1	Ni.	F−2, D+3	7·1	
" 12	35	45	2	Bh.	2−2·5, 3+5	7·4	
" 16	39	"	"	"	3+2	7·7	Pale yellow.
" 16	39	t.22	1	Ni.	F−3, D+1	7·2	
" 20	43	45	"	Bh.	2−4, 4+4	7·6	White.
" 23	46	"	"	"	2−3, 3+2	7·6	
" 25	48	t.22	"	Ni.	F−4, D+1	7·3	Yellowish orange.
" 28	51	45	2	Bh.	3+1	7·8	
" 31	54	"	"	"	=3	7·9	
June 5	59	t.22	1	Ni.	D−3, 5+5·5	7·7	
" 6	60	45	2	Bh.	3+1	7·8	Bright yellow.
" 6	60	T.25	1	Bn.	1−8, 2+2·5	6·9	
" 9	63	30	"	Go.	2−4, 3+2	7·6	
" 10	64	t.30	"	Bn.	2+1	7·1	
" 10	64	45	"	Bh.	3+1	7·8	
" 13	67	"	2	"	3−1, =4	8·0	Dull orange.
" 18	72	t.22	1	Ni.	D−5, 5+4	7·9	
" 18	72	30	2	Go.	4−2, 5+1	8·2	
" 19	73	45	"	Bh.	5−3, =6, 7+3	8·6	Dull orange.
" 20	74	T.25	1	Bn.	2−3, 3+3	7·5	
" 23	77	T.50	"	"	2−3, 3+3	7·5	
" 29	83	45	2	Bh.	5−3, 6−2, 7+2, 8+3	8·6	
July 4	88	"	"	"	5−1, 6+1	8·4	Bright yellow.
" 5	89	"	1	"	4−3, =5, 6+3	8·2	
" 8	92	"	"	"	5−2, =6, 7+4	8·5	
" 8	92	T.50	"	Bn.	3+1, 4+2	7·8	
" 9	93	t.22	"	Ni.	5−1, 7+5	8·4	
" 11	95	45	"	Bh.	5−3, =6, 7+3	8·6	
" 12	96	30	"	Go.	5−4·5, 8+1	8·8	
" 13	9597	T.50	"	Bn.	5−1·5, 6+1	8·4	

(6849) R AQUILÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
July 15	9599	T.50	1	Bn.	5−1·5, 6+1	8·4	
,, 16	9600	45	,,	Bh.	=6	8·5	
,, 19	03	30	,,	Go.	5−4·5, 8+1	8·8	
,, 23	07	t.22	,,	Ni.	5−4, 7+1	8·7	
,, 25	09	45	2	Bh.	=6, =7	8·7	
,, 28	12	T.94	1	Ni.	5−5, 7+1	8·8	
,, 30	14	45	2	Bh.	6−2, 8+2	8·7	
,, 30	14	T.50	1	Bn.	5−4, 6−3, 7+1, 8+1	8·8	
Aug. 2	17	45	,,	Bh.	11−4, =12, =13, 15+4	9·6	Whitish yellow.
,, 6	21	30	2	Go.	=8	8·9	
,, 6	21	T.94	,,	Ni.	7−3, 13+3	9·2	
,, 11	26	45	1	Bh.	=15	10·1	
,, 13	28	T.94	2	Ni.	7−5·5, 13+1	9·4	
,, 19	34	45	,,	Bh.	14−1, =15, 16+1	10·1	
,, 27	42	,,	,,	,,	=17, =18	10·5	
,, 29	44	,,	,,	,,	=18	10·5	
Sept. 1	47	T.94	1	Ni.	13−11, 23+5·5	10·6	
,, 2	48	T.95	,,	Bn.	21−0·5, 23+2	10·9	
,, 2	48	45	,,	Bh.	20−1, =21, 22+1	10·9	
,, 6	52	,,	,,	,,	18−5, =20, =21, 24+5	10·9	
,, 9	55	,,	2	,,	21−1, 23+1	11·0	
,, 11	57	T.94	1	Ni.	13−13, 23+3·5	10·8	
,, 15	61	30	,,	Go.	=24	11·4	
,, 18	64	90	,,	Bh.	23−2, =24, =25, 27+2	11·4	
,, 20	66	T.94	,,	Ni.	13−13, 23+3·5	10·8	
,, 20	66	T.120	,,	Bn.	23+1	11·0	
,, 22	68	90	2	Bh.	23−1, 24+1, =25	11·3	
,, 24	70	,,	,,	,,	=25	11·3	
Oct. 1	77	,,	,,	,,	23−5, 25−1, 30+1, 32+5	11·5	
,, 2	78	T.120	1	Bn.	=23	11·1	
,, 3	79	T.94	,,	Ni.	23+1	11·0	
,, 4	80	T.150	,,	Bn.	23−0·5	11·2	
,, 6	82	80	,,	Gd.	=25	11·3	
,, 7	83	T.150	,,	Bn.	23−1, 30+2	11·3	
,, 7	83	150	2	Bh.	23−5, 24−1, 30+1, 32+5	11·5	
,, 9	85	T.94	1	Ni.	=23	11·1	
,, 10	86	T.120	,,	Bn.	23−1, 30+2	11·3	
,, 16	92	30	,,	Go.	=24	11·4	
,, 17	93	90	2	Bh.	30−2, 32+2	11·8	
,, 19	9695	T.94	1	Ni.	=23	11·1	
,, 29	9705	90	,,	Bh.	=23	11·1	
Nov. 1	08	T.120	2	Bn.	23−1, 30+3·5	11·2	
,, 3	10	T.94	1	Ni.	13−14, 23+2·5	10·9	
,, 3	10	T.120	,,	Bn.	=23	11·1	
,, 3	10	90	,,	Bh.	21−2, 23+1, 25+2	11·1	
,, 7	14	,,	,,	,,	23+1, 25+2	11·1	
,, 10	9717	30	,,	Go.	=23	11·1	

(6849) R AQUILÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Nov. 11	9718	45	1	Bh.	18−3, =20, 23+3	10·8	
„ 13	20	T.120	„	Bn.	=21, 23+2	10·9	
„ 17	24	45	2	Bh.	=18, =20	10·6	
„ 18	25	T.94	1	Ni.	13−11, 23+5·5	10·6	
„ 20	27	90	2	Bh.	13−5, 15+1·5	10·0	
„ 25	32	45	„	„	11−4, 13−2, 15+4	9·7	
„ 27	34	T.95	1	Bn.	15−4, 21+4	10·5	
„ 30	37	„	„	„	15−2·5, 21+5	10·4	
„ 30	37	45	2	Bh.	13−3, 15+3	9·8	
Dec. 2	39	T.94	1	Ni.	13−5·5, 23+11	10·0	
„ 5	42	45	2	Bh.	11−6, 13−1, 17+6	9·8	
„ 9	46	T.94	1	Ni.	13−6, 23+10	10·1	
„ 12	49	T.50	„	Bn.	12−4, 15+2·5	9·9	
„ 12	49	79	„	Ma.	21+2·5	10·6	Erroneous. [C.L.B.]
„ 13	50	45	2	Bh.	11−1, 13+1	9·4	
„ 16	53	„	1	„	10−2, 11−1, 12+1, 13+2	9·3	
„ 16	53	79	„	Ma.	=13	9·5	About.
„ 16	53	T.50	„	Bn.	12−4·5, 15+2	9·9	
„ 18	55	„	„	„	12−2, 15+4·5	9·7	
„ 20	57	T.94	„	Ni.	=13	9·5	
„ 23	60	45	2	Bh.	10−2, =11, 13+2	9·3	
„ 25	62	„	„	„	9−2, =10, 13+2	9·2	
„ 28	65	„	1	„	6−4, =7, =8, 11+4	8·9	Dull red.
„ 29	66	T.94	„	Ni.	5−2, 7+4	8·5	
„ 29	66	T.50	2	Bn.	8−2, 11+1	9·1	
„ 30	67	„	1	„	5−4, 6−2, 7+2, 8+2	8·7	
„ 31	68	45	2	Bh.	5−3, =6, 7+3	8·6	
1913.							
Jan. 2	70	„	„	„	5−3, 6−2, 7+3, 8+2	8·6	
„ 5	73	„	„	„	5−3, =6, 8+3	8·6	
„ 8	76	„	„	„	4−2, 5+2	8·1	
„ 11	79	„	„	„	=4	7·9	Dull crimson.
„ 17	85	„	„	„	3+3, 4+4	7·6	Crimson.
„ 21	89	„	„	„	2−2, 3+5, 4+5	7·4	
„ 26	94	„	1	„	1−9, =2, 3+9	7·0	
„ 31	99	„	2	„	=1, 2+5	6·4	
„ 31	9799	t.22	„	Ni.	1−7, F+1	6·8	
Feb. 1	9800	T.25	1	Bn.	1+1	6·0	
„ 4	03	45	„	Bh.	=1	6·1	Deep red.
„ 8	07	„	2	„	1+1	6·0	
„ 12	11	„	1	„	1+2	5·9	Crimson.
„ 15	14	t.22	„	Ni.	=1	6·1	
„ 21	20	45	2	Bh.	1+1	6·0	Orange crimson.
„ 27	26	„	1	„	1+5	5·6	
Mar. 1	28	t.22	„	Ni.	=1	6·1	
„ 4	31	45	„	Bh.	1+5	5·6	Orange red.
„ 11	9838	„	„	„	=1	6·1	Very red.

(6849) R AQUILÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Mar. 14	9841	45	2	Bh.	1−5, 3+10	6·7	
„ 18	45	t.22	1	Ni.	=F	6·9	
„ 20	47	45	2	Bh.	1−9, 3+9	7·0	
„ 27	54	„	1	„	2+3, 3+10	6·9	
Apr. 1	59	„	„	„	2+3, 3+5, 4+10	7·1	
„ 5	63	„	2	„	1−6, 4+12	6·7	
„ 7	65	„	1	„	3+5, 4+7	7·3	
„ 7	65	t.22	„	Ni.	D−3, 5+6	7·7	
„ 17	75	45	„	Bh.	1−12, 3+6, 4+5	7·3	
„ 20	78	t.22	„	Ni.	D−6, 5+3	8·0	
„ 25	83	45	2	Bh.	3−1, =4	8·0	
„ 29	87	t.22	1	Ni.	D−9, 5+1	8·2	
May 1	89	T.50	„	Bn.	=3	7·9	
„ 2	90	45	2	Bh.	5−3, =6, 7+3	8·6	
„ 10	98	T.50	1	Bn.	5−1, 6+0·5	8·4	
„ 11	99	t.22	„	Ni.	5−5, 7+0·5	8·8	
„ 11	9899	90	„	Bh.	5−5·5, =7, 9+2	8·8	
„ 13	9901	T.50	„	Bn.	5−1, 6+0·5	8·4	
„ 15	03	T.94	„	Ni.	=5	8·3	In t.22, 8·7.
„ 16	04	90	2	Bh.	7−2, 8−1, 10+1, 11+2	9·0	
„ 25	13	„	1	„	12−1, =13	9·5	
„ 26	14	T.94	„	Ni.	=7	8·9	In t.22, 9·3.
„ 29	17	T.50	2	Bn.	11−1, =13	9·4	
„ 31	19	45	1	Bh.	=12, =13	9·5	
June 3	22	T.50	„	Bn.	12−5, 15+1·5	10·0	
„ 3	22	79	„	Ma.	7−3, 13+3	9·2	
„ 4	23	45	„	Bh.	15+1	10·0	
„ 7	26	T.50	„	Bn.	12−5, 15+1·5	10·0	
„ 8	27	79	„	Ma.	11−2, =13	9·5	Red.
„ 8	27	T.94	„	Ni.	13−4, 23+12	9·9	
„ 10	29	79	„	Ma.	=11, 13+2	9·3	
„ 11	30	45	„	Bh.	15+1	10·0	
„ 21	40	„	„	„	13−6·5, 15−1, 23+10	10·2	
„ 23	42	T.50	„	Bn.	15−3, 23+6	10·5	
„ 27	46	79	„	Ma.	18−2, 20+2, 23+6	10·6	
„ 27	46	90	2	Bh.	13−13, =21, 23+3·5	10·8	
July 3	52	T.120	1	Bn.	23−2, 30+1	11·4	
„ 6	55	60	2	Go.	=23	11·1	
„ 7	56	90	„	Bh.	=21, 23+2	10·9	
„ 7	56	T.94	1	Ni.	13−14·5, 23+2	10·9	
„ 11	60	183	„	Ma.	23+1	11·0	No colour.
„ 12	61	T.94	„	Ni.	13 15, 23+1·5	11·0	
„ 12	61	T.120	„	Bn.	23−1, 30+3·5	11·2	
„ 19	68	90	„	Bh.	23−2, 30+2	11·4	
„ 24	73	T.167	„	Bn.	23−3, 30+1·5	11·4	
„ 24	73	79	„	Ma.	=23	11·1	
„ 30	79	T.150	„	Bn.	23−3, 30+1·5	11·4	
„ 30	79	150	„	Bh.	23−3, 30+1·5	11·4	
„ 31	9980	183	„	Ma.	23−2, 30+2	11·4	

(6849) R AQUILÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Aug. 12	9992	T.94	1	Ni.	23−1, 30+3·5	11·2	
,, 16	9996	90	,,	Bh.	23−3, 30+1·5	11·4	
,, 22	0002	T.94	,,	Ni.	23−2, 30+2·5	11·3	
,, 24	04	150	,,	Bh.	23−3, 30+1·5	11·4	
Sept. 2	13	,,	,,	,,	23−2, 30+2	11·4	
,, 4	15	T.94	,,	Ni.	23−4, 30+1	11·5	
,, 5	16	150	,,	Bh.	=23, 24+2, 25+1	11·2	
,, 6	17	T.120	,,	Bn.	23−3·5, 30+1	11·5	
,, 7	18	183	,,	Ma.	23−3, 30+1·5	11·4	
,, 9	20	150	,,	Bh.	23−1, 25+1	11·2	
,, 11	22	T.94	,,	Ni.	23−1, 30+3·5	11·2	
,, 12	23	183	,,	Ma.	23−1, 30+3	11·3	
,, 20	31	,,	2	,,	23+1	11·0	
,, 20	31	90	1	Bh.	23+1, 24+2	11·1	
,, 21	32	T.94	,,	Ni.	23+1	11·0	
,, 24	35	T.120	,,	Bn.	23−1, 30+3·5	11·2	
,, 24	35	183	,,	Ma.	23−1, 30+3·5	11·2	
,, 26	37	,,	,,	,,	23−1·5, 30+3	11·3	
,, 27	38	150	,,	Bh.	23+2	10·9	
,, 28	39	T.120	,,	Bn.	21−2, 23+0·5	11·1	
,, 28	39	183	,,	Ma.	23−1, 30+3·5	11·2	No colour.
,, 30	41	,,	,,	,,	23+2	10·9	
Oct. 3	44	T.95	,,	Bn.	21−0·5, 23+2	10·9	
,, 3	44	79	2	Ma.	13−12, 23+4	10·7	
,, 5	46	90	,,	Bh.	=20, =21	10·9	
,, 6	47	T.94	1	Ni.	13−13, 23+3·5	10·8	
,, 12	53	90	2	Bh.	18−2, 20+2, 21+2	10·7	
,, 16	57	,,	1	,,	=18	10·5	
,, 16	57	T.94	,,	Ni.	13−4, 23+12·5	9·9	
,, 19	60	60	,,	Go.	13−9, 25+9	10·4	
,, 19	60	90	,,	Bh.	15−2, 18+2	10·3	
,, 23	64	,,	,,	,,	=12, =13	9·5	
,, 23	64	79	,,	Ma.	7−2·5	9·1	
,, 25	66	T.94	,,	Ni.	13−8, 23+8	10·3	
,, 28	69	,,	,,	,,	13−3·5, 23+13	9·8	
,, 29	70	45	,,	Bh.	11−1, 12+1	9·4	
Nov. 1	73	,,	,,	,,	7−2, 8−2, 11+2, 13+4	9·1	
,, 1	73	T.50	,,	Bn.	10−2·5, 11−1, 12+1, 13+1	9·4	
,, 1	73	79	,,	Ma.	11−2, 13+1	9·4	
,, 7	79	45	,,	Bh.	=6, =7	8·7	
,, 7	79	79	2	Ma.	11−1, 13+2	9·3	
,, 17	89	45	,,	Bh.	5−3, =6, 8+3	8·6	
,, 19	91	T.50	,,	Bn.	5−1, 6+1	8·4	
,, 19	91	T.94	1	Ni.	5+4	7·9	In t.22, 8·5.
,, 22	94	t.22	,,	,,	D−3, 5+6	7·7	
,, 22	94	T.50	,,	Bn.	3+2	7·7	
,, 22	94	45	,,	Bh.	=3, =4	7·9	
,, 22	0094	50	2	Ma.	3−3, 6+3	8·2	Pale red.
Dec. 2	0104	45	1	Bh.	1−10·5, 3+7	7·2	
,, 4	0106	,,	,,	,,	1−6, 3+12	6·7	

(6849) R AQUILÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Dec. 9	0111	45	1	Bh.	1−4·5, 3+13	6·6	
„ 12	14	„	„	„	=1	6·1	
„ 14	16	T.25	„	Bn.	1−1, 2+9·5	6·2	
„ 16	18	45	„	Bh.	=1	6·1	
„ 18	20	T.25	„	Bn.	1−1, 2+9·5	6·2	
„ 18	20	45	„	Bh.	1+1·5	6·0	
„ 18	20	t.22	2	Ni.	H−1, 1+3	5·8	Difficult.
„ 21	23	45	1	Bh.	1+3	5·8	
„ 27	29	„	„	„	1+5	5·6	
„ 28	30	T.25	„	Bn.	1+1	6·0	
„ 31	33	„	„	„	1+2	5·9	
„ 31	33	45	2	Bh.	1+3	5·8	
1914.							
Jan. 5	38	„	„	„	1+3	5·8	
„ 5	38	T.25	1	Bn.	1+2	5·9	
„ 11	44	45	2	Bh.	1+2	5·9	
„ 14	47	„	1	„	1+3	5·8	
„ 23	56	t.22	2	Ni.	1−6, F+1	6·8	
„ 25	58	45	1	Bh.	1−3·5, 3+14	6·5	
Feb. 1	65	t.22	2	Ni.	F−3·5, D+2	7·2	
„ 4	68	T.50	1	Bn.	1−8·5, 2+2	7·0	
„ 6	70	45	„	Bh.	1−3·5, 2+5, 3+14	6·5	
„ 19	83	„	„	„	1−12·5, 2−2, 3+5	7·4	
„ 23	87	90	„	„	=3, =4	7·9	
„ 26	90	„	2	„	3−5, =5, 6+2·5	8·3	
„ 28	0192	T.25	1	Bn.	2−5, 3+1	7·7	
Mar. 12	0204	T.94	„	Ni.	=5	8·3	
„ 16	08	„	„	„	=5	8·3	
„ 18	10	90	2	Bh.	=6, 7+2, 8+2	8·6	
„ 21	13	„	1	„	5−2, 6−2, 7+2, 8+4	8·6	
„ 22	14	T.94	„	Ni.	=5, 7+4	8·4	
„ 25	17	90	2	Bh.	=7, =8	8·9	
Apr. 1	24	„	„	„	6−3, =11, 13+6	9·0	
„ 6	29	„	1	„	7−3, 11+1	9·2	
„ 12	35	„	„	„	=12, =13	9·5	
„ 12	35	T.94	„	Ni.	7−1·5, 13+5	9·0	
„ 16	39	90	„	Bh.	=12, =13	9·5	
„ 16	39	40	„	La.	10−4, =12, =13, 15+5	9·5	
„ 18	41	T.94	„	Ni.	7−2·5, 13+4	9·1	
„ 21	44	40	„	La.	13−5, =15	10·1	
„ 25	48	T.50	„	Bn.	12−5, 15+1·5	10·0	
„ 26	49	90	2	Bh.	13−6, 15−2	10·2	
„ 26	49	T.94	1	Ni.	=13	9·5	
„ 28	51	40	„	La.	15−3, 23+7	10·4	
May 6	59	„	„	„	=19, 23+3	10·8	
„ 10	63	90	„	Bh.	13−9, 21+4·5	10·4	
„ 14	67	„	„	„	20−2, 23+1	11·0	
„ 15	68	T.94	„	Ni.	13−9, 23+7·5	10·4	
„ 16	69	T.95	„	Bn.	15−7, 21+1	10·8	
„ 18	0271	90	„	Bh.	21−1, 23+1	11·0	

(6849) R AQUILÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
May 21	0274	T.95	1	Bn.	15−5·5, 21+2	10·7	
,, 22	75	40	,,	La.	=23, 24+4, 30+6	11·0	
,, 25	78	T.120	,,	Bn.	21−2, 23+0·5	11·1	
,, 25	78	150	,,	Bh.	=23	11·1	
,, 30	83	T.94	,,	Ni.	13−14, 23+3·5	10·8	
June 2	86	40	,,	La.	23−1, 24+2, 30+4	11·2	
,, 3	87	150	,,	Bh.	23−1	11·2	
,, 7	91	T.94	,,	Ni.	23+1	11·0	
,, 10	94	90	,,	Bh.	23−1·5, 30+3	11·3	
,, 13	97	,,	,,	,,	23−1·5, 30+3	11·3	
,, 13	97	40	,,	La.	23−3, =24, 30+3	11·4	
,, 14	98	T.150	,,	Bn.	23−1, 20+3·5	11·2	
,, 15	0299	150	,,	Bh.	23−2, 30+2·5	11·3	
,, 17	0301	40	,,	La.	23−3, =24, 30+2	11·4	
,, 22	06	,,	,,	,,	23−4, =24, 30+2	11·4	
,, 22	06	150	,,	Bh.	23−2·5, 30+2	11·4	
,, 23	07	T.150	,,	Bn.	23−3·5, 30+1	11·5	
,, 25	09	150	,,	Bh.	23−2, 30+2	11·4	
,, 25	09	40	,,	La.	23−3, =24, 30+3	11·4	
,, 27	11	183	,,	Ma.	23−1, 30+3·5	11·2	
,, 28	12	T.150	,,	Bn.	23−3, 30+1·5	11·4	
,, 29	13	183	,,	Ma.	23−1, 30+3·5	11·2	
,, 30	14	T.94	,,	Ni.	13−8, 23+8	10·3	Doubtful. [C.L.B.].
July 3	17	90	,,	Bh.	23−3, 30+1·5	11·4	
,, 7	21	T.94	,,	Ni.	13−12·5, 23+3	10·8	
,, 9	23	T.150	,,	Bn.	23−3, 30+1·5	11·4	
,, 12	26	183	,,	Ma.	23−0·5, 30+4	11·2	
,, 13	27	90	,,	Bh.	23−1·5, 30+3	11·3	
,, 14	28	40	2	La.	23−3, 24+1, 30+3	11·3	
,, 17	31	183	1	Ma.	23−1·5, 30+3	11·3	
,, 17	31	T.94	,,	Ni.	13−13, 23+3·5	10·8	
,, 19	33	90	,,	Bh.	=23	11·1	
,, 20	34	40	,,	La.	23−3, 24−1, 30+4	11·4	
,, 20	34	183	,,	Ma.	23−1	11·2	
,, 24	38	,,	,,	,,	23+1	11·0	
,, 28	42	90	,,	Bh.	=23	11·1	
,, 29	43	T.120	,,	Bn.	21−2, 23+0·5	11·1	
,, 30	44	90	,,	Bh.	23+1	11·0	
,, 31	45	40	,,	La.	19−2, 23+2	10·9	
Aug. 2	47	T.94	,,	Ni.	13−11, 23+5·5	10·6	
,, 3	48	79	,,	Ma.	13−10, 23+6·5	10·5	
,, 3	48	45	,,	Bh.	15−5, 23+5	10·6	
,, 7	52	,,	,,	,,	=15	10·1	
,, 11	56	T.94	,,	Ni.	13−8, 23+8	10·3	
,, 12	57	40	,,	La.	=19, 23+4	10·7	
,, 14	59	90	,,	Bh.	13−6·5, 15+1, 23+10	10·1	
,, 17	62	45	,,	,,	13−5, 15+1·5	10·0	
,, 17	62	T.94	,,	Ni.	13−8, 23+8·5	10·3	
,, 23	68	90	,,	Bh.	=12, =13	9·5	
,, 25	70	20	2	La.	13−5, =15	10·1	
,, 26	71	T.50	1	Bn.	12−3, 15+3	9·8	
,, 28	73	T.95	,,	,,	12−4·5, 15+2	9·9	
,, 28	0373	45	,,	Bh.	=11, 13+2	9·3	

(6849) R AQUILÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914. Sept. 1	0377	45	1	Bh.	6−6, 7−2, 11+2, 13+3	9·1	
,, 1	77	40	,,	Bc.	11−3, 12−1, 13−1	9·6	
,, 1	77	T.94	,,	Ni.	7−5, 13+1·5	9·3	
,, 5	81	T.50	,,	Bn.	12−1, 15+5	9·6	
,, 6	82	45	,,	Bh.	=7, =8	8·9	
,, 11	87	T.50	,,	Bn.	12+1	9·4	
,, 12	88	40	,,	La.	8−2, =10, 12+5, 13+5	9·0	
,, 12	88	,,	,,	Bc.	11+1, 12+3, 13+3	9·2	
,, 15	91	90	,,	Bh.	6−2, 7+1	8·7	
,, 16	92	40	,,	Bc.	4−3, 5+1, 6+2	8·2	
,, 17	93	T.94	,,	Ni.	=5	8·3	In t.22, 8·9.
,, 19	95	T.50	,,	Bn.	5−4, 8+1·5	8·7	
,, 20	0396	45	,,	Bh.	=3, =4	7·9	
,, 24	0400	T.50	,,	Bn.	4−2·5, 5+1	8·2	
,, 25	01	45	,,	Bh.	3+2, 4+2	7·7	
,, 25	01	t.22	,,	Ni.	=5	8·3	
,, 27	03	T.50	,,	Bn.	=3, =4	7·9	
,, 29	05	,,	,,	,,	3+1	7·8	
Oct. 4	10	45	,,	Bh.	2−5, 3+3	7·6	
,, 5	11	T.50	,,	Bn.	2−5, 3+2	7·7	
,, 5	11	20	,,	La.	4+10	6·9	
,, 5	11	40	,,	Bc.	4−1, 5+3	8·0	
,, 6	12	t.22	,,	Ni.	D−6, 5+3	8·0	
,, 10	16	45	,,	Bh.	1−10·5, 3+7	7·2	
,, 11	17	T.50	,,	Bn.	1−9, 2+1·5	7·0	
,, 14	20	45	,,	Bh.	1−9, =2, 3+9	7·0	
,, 15	21	24	2	Wa.	=1	6·1	
,, 18	24	T.50	1	Bn.	1−8, 2+2·5	6·9	
,, 18	24	45	,,	Bh.	1−3·5, 3+14	6·5	
,, 27	33	,,	,,	,,	=1	6·1	Orange yellow.
Nov. 1	38	T.50	,,	Bn.	1−2, 2+8·5	6·3	
,, 2	39	t.22	,,	Ni.	1+2	5·9	
,, 3	40	45	,,	Bh.	1+2	5·9	
,, 7	44	,,	,,	,,	1+3	5·8	
,, 7	44	40	,,	Bc.	1−3	6·4	
,, 9	46	20	,,	La.	=1	6·1	
,, 13	50	t.22	,,	Ni.	1+2·5	5·9	
,, 13	50	20	,,	La.	=1	6·1	
,, 14	51	T.50	,,	Bn.	1−2	6·3	
,, 14	51	45	,,	Bh.	1+3	5·8	
,, 16	53	,,	,,	,,	1+4	5·7	
,, 18	55	T.25	,,	Bn.	1−2	6·3	
,, 18	55	t.22	,,	Ni.	1+1·5	6·0	
,, 20	57	45	,,	Bh.	1+4	5·7	Dull orange.
,, 22	59	,,	,,	,,	1+1	6·0	Red.
,, 26	63	20	,,	La.	1−2	6·3	
,, 28	65	45	,,	Bh.	1−2	6·3	In F. 6·1.
Dec. 1	68	,,	2	,,	1−7, 2+3·5	6·8	
,, 1	68	T.50	1	Bn.	1−2·5, 2+8	6·4	
,, 2	69	t.22	2	Ni.	1−4, D+8·5	6·5	
,, 5	0472	T.50	1	Bn.	1−3·5, 2+7	6·5	

(6849) R AQUILÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Dec. 6	0473	20	2	La.	1−4, 2+5	6·6	
,, 7	74	45	1	Bh.	1−5, 2+5	6·6	
,, 10	77	,,	2	,,	1−6, 2+3	6·8	
,, 16	83	,,	,,	,,	1−6, 2+3	6·8	
,, 16	83	T.50	1	Bn.	1−8, 2+2·5	6·9	
,, 19	86	45	2	Bh.	1−6, 2+4	6·7	
,, 20	87	t.22	1	Ni.	F−3·5, D+2	7·2	
,, 24	91	,,	,,	,,	F−4, D+1	7·3	Orange.
,, 26	93	45	,,	Bh.	2+2	7·0	
,, 27	94	40	2	La.	2−2, 3+5	7·4	
,, 30	97	45	,,	Bh.	2+0·5	7·1	
,, 30	0497	t.22	1	Ni.	D−2, 5+7	7·6	

(7045) R CYGNI. (V. 1.)

H.D. 193449.

NOTES.

Star A = D.M. + 49° 3033, 7·83 m. H.A., Vol. XXXVII. p. 183.

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Jan. 8	8680	T.94	1	Ni.	31−1, 33+1	11·0	
,, 10	82	160	,,	Br.	36−2, 39+2	11·5	
,, 10	82	t.120	,,	Bn.	35−3, 41+1	11·6	
,, 26	8698	T.120	,,	,,	=41, 45+1	11·8	
,, 30	8702	,,	,,	,,	41−1, =45	11·9	
Feb. 1	04	T.94	2	Ni.	=38	11·6	
,, 8	11	T.150	1	Bn.	45+1	11·8	
,, 11	14	T.94	,,	Ni.	50−3, x+3·5	12·4	
,, 18	21	160	,,	Br.	43−2, 59+2	11·9	
Mar. 2	33	T.94	,,	Ni.	50−5, x+2	12·6	
,, 3	34	160	2	Br.	56−2, x+2	12·6	
,, 10	41	,,	,,	,,	=x	12·8	
,, 14	45	T.94	1	Ni.	x−4, z+4	13·2	
,, 20	51	160	2	Br.	x−3	13·1	Glimpsed.
,, 30	61	240	1	,,	=z	13·5	
,, 30	61	T.94	,,	Ni.	x−4·5, z+3	13·2	
Apr. 11	73	,,	,,	,,	z−2	13·7	
,, 27	89	,,	2	,,	z−3	13·8	Uncertain.
May 2	94	240	1	Br.	z−3, a+1	13·8	
,, 7	8799	T.94	2	Ni.	z−4	13·9	
,, 14	8806	T.200	1	Bn.	<60	<13·1	Invisible.

(7045) R CYGNI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
May 18	8810	160	1	Br.	=a	13·9	About.
,, 27	19	320	,,	,,	a−1	14·0	
June 2	25	T.94	2	Ni.	z−3	13·8	Uncertain.
,, 9	32	,,	,,	,,	z−2	13·7	,,
,, 13	36	320	1	Br.	a−2	14·1	
,, 18	41	T.150	,,	Bn.	<x	<12·8	
,, 26	49	183	,,	Ma.	<60	<13·1	
July 1	54	T.94	,,	Ni.	x−6, z+3	13·3	
,, 3	56	320	,,	Br.	60−2, z+2	13·3	
,, 10	63	T.94	,,	Ni.	x−1·5, z+6	12·9	
,, 11	64	240	,,	Br.	x−4, z+4	13·2	
,, 11	64	T.150	,,	Bn.	x−1	12·9	
,, 12	65	183	,,	Ma.	59−4, x+2	12·5	
,, 23	76	132	,,	F.G.B.	=59	12·1	
,, 23	76	T.150	,,	Bn.	56−3, x+1	12·7	
,, 27	80	T.94	,,	Ni.	50−2, x+4	12·3	
,, 31	84	240	,,	Br.	=56, =59	12·2	
,, 31	84	132	2	F.G.B.	59−2, 56+1	12·3	
Aug. 2	86	,,	1	,,	=56	12·4	
,, 5	89	160	,,	Br.	=59	12·1	
,, 9	93	T.94	,,	Ni.	38−2, 50+3	11·8	
,, 11	8895	66	2	F.G.B.	43−4, 56+2	12·2	
,, 19	8903	T.94	1	Ni.	36−1, 38+1	11·5	
,, 22	06	160	,,	Br.	36−2, 43+2	11·6	
,, 26	10	66	,,	F.G.B.	36−2, 43+2	11·6	
,, 31	15	80	2	Br.	=30	10·5	
Sept. 1	16	t.75	1	Bn.	32−1·5	11·1	
,, 3	18	60	,,	Gh.	31−2, =32, 36+3	11·1	
,, 3	18	t.100	,,	Bn.	29−4·5, 35+2	11·1	
,, 3	18	66	,,	F.G.B.	=30	10·5	
,, 3	18	79	,,	Ma.	14−9, 36+6	10·8	
,, 8	23	160	2	Br.	14−5	10·4	
,, 9	24	66	1	F.G.B.	=14	9·9	
,, 11	26	79	,,	Ma.	=14	9·9	
,, 12	27	66	,,	F.G.B.	11−2, 14+0·5	9·8	
,, 16	31	45	,,	Br.	=11, 14+2	9·7	
,, 19	34	T.25	,,	Bn.	5−0·5, =6	9·1	
,, 20	35	66	,,	F.G.B.	6−2, 11+2	9·4	
,, 20	35	T.94	,,	Ni.	5−1·5, 14+7	9·2	Orange yellow. In t.22, 9·5.
,, 24	39	T.50	,,	Bn.	=5, =6	9·1	
,, 25	40	T.94	2	Ni.	=5	9·1	Orange yellow. In t. 22, 9·1.
,, 27	42	60	1	Gh.	6−4·5, =11, 14+3	9·6	
,, 27	42	T.50	,,	Bn.	4−4, 5+1, 6+1	9·0	
,, 27	42	45	,,	F.G.B.	=6	9·1	
,, 29	44	T.50	,,	Bn.	4−3, =5, 6+1	9·0	
Oct. 3	48	30	,,	Gh.	6−2, =7, =8, 11+3	9·4	
,, 6	51	T.50	,,	Bn.	4−3·5, 6+1	9·0	
,, 6	51	t.22	,,	Ni.	3−5, 5+2	8·9	Yellowish orange.
,, 8	8953	30	,,	Gh.	6−3, =7, =8, 14+4·5	9·4	

(7045) R CYGNI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Oct. 10	8955	45	1	F.G.B.	4−1·5, 5+3	8·8	
„ 14	59	„	„	Br.	3−2, 4+2	8·5	
„ 15	60	30	„	Gh.	4−2, 5+1, =6	9·0	
„ 17	62	t.22	„	Ni.	3−4, 5+2	8·8	
„ 20	65	45	„	F.G.B.	4−1·5, 5+3	8·8	
„ 22	67	T.50	„	Bn.	4−2, 5+2	8·8	
„ 28	73	„	„	„	4−1, 5+3	8·7	
„ 28	73	t.22	„	Ni.	3−5, 5+2	8·9	
„ 28	73	45	„	F.G.B.	=4	8·6	
„ 28	73	30	„	Gh.	4−6, =6, 11+4	9·2	
„ 30	75	45	„	Br.	=4	8·6	
Nov. 1	77	t.60	„	Bn.	4−2, 5+1	8·9	
„ 1	77	45	„	F.G.B.	=4	8·6	
„ 7	83	T.50	„	Bn.	4−2, 5+1	8·9	
„ 7	83	30	„	Gh.	6−3, =11, 14+4·5	9·5	
„ 7	83	45	„	F.G.B.	4−2, 5+2	8·8	
„ 8	84	t.22	„	Ni.	3−5, 5+2	8·9	
„ 9	85	45	„	Br.	4−1, 5+3	8·7	
„ 16	92	T.50	„	Bn.	4−3, 5+1	8·9	
„ 16	92	45	„	F.G.B.	4−2, 5+1·5	8·9	
„ 17	93	38	2	Gd.	4−2, 5+2	8·8	
„ 20	96	45	1	Br.	4−2, 5+2	8·8	
„ 20	96	t.60	„	Bn.	4−3·5, 5+1	9·0	
„ 21	8997	t.22	„	Ni.	3−4, 5+2	8·8	Yellowish white.
„ 25	9001	30	„	Gh.	6−3, =11, 14+4·5	9·5	
„ 28	04	45	„	Br.	=5, 6+2	9·0	
„ 28	04	T.50	„	Bn.	=5, =6	9·1	
„ 28	04	60	„	Gh.	6−3, =11, 14+4·5	9·5	
Dec. 6	12	„	„	„	6−4·5, =11, 14+3	9·6	
„ 6	12	45	„	F.G.B.	=5	9·1	
„ 7	13	t.22	„	Ni.	3−5, 5+1	8·9	
„ 11	17	45	„	Br.	=5	9·1	
„ 18	24	T.50	„	Bn.	4−3, =5	9·0	
„ 18	24	t.22	„	Ni.	3−6, 5+1	9·0	Yellow.
„ 19	25	160	„	Br.	6−3, 11+3	9·4	
„ 22	28	T.50	„	Bn.	=6	9·1	
„ 22	28	30	2	Gh.	7−1, 11+1·5	9·5	
„ 24	30	t.60	1	Bn.	4−4, =5, =6	9·1	
„ 24	30	45	„	F.G.B.	6−1·5, 14+6	9·3	
„ 27	33	t.22	„	Ni.	5+0·5	9·0	Yellow.
„ 28	34	60	„	Gh.	13−2, 14+2	9·7	
„ 29	35	t.60	„	Bn.	5−2, 6−1, 8+2, 9+3	9·2	
„ 30	36	160	„	Br.	11−1, 14+3	9·7	
1911.							
Jan. 1	38	t.60	„	Bn.	6−2, 9+1	9·4	
„ 7	44	„	„	„	6−2, 9+1	9·4	
„ 7	44	66	2	F.G.B.	=11	9·6	
„ 7	44	60	1	Gh.	11−1, 14+1	9·8	
„ 10	47	T.94	„	Ni.	5−4, 14+4·5	9·4	
„ 16	53	160	2	Br.	14+2	9·7	
„ 28	65	„	1	„	14−5, 31+5	10·4	
„ 28	9065	60	2	Gh.	=14	9·9	

(7045) R CYGNI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
Jan. 29	9066	T.94	1	Ni.	5−5, 14+3·5	9·5	Yellowish orange. In t.22, 9·8.
,, 30	67	T.95	,,	Bn.	14−1	10·0	
,, 30	67	66	,,	F.G.B.	=14	9·9	
,, 30	67	60	2	Gh.	=31	10·9	
Feb. 9	77	T.94	1	Ni.	=14	9·9	
,, 11	79	160	,,	Br.	14−5	10·4	
,, 19	87	T.94	,,	Ni.	14+0·5	9·8	
,, 26	9094	,,	,,	,,	14−2, 31+8·5	10·1	
Mar. 4	9100	160	2	Br.	32−1, 33+0·5	11·1	
,, 4	00	T.120	1	Bn.	=31	10·9	
,, 9	05	T.94	,,	Ni.	14−9, 31+1·5	10·8	
,, 19	15	,,	,,	,,	31−1·5, 33+1	11·1	
,, 31	27	,,	,,	,,	36−1, 38+0·5	11·4	
Apr. 3	30	160	,,	Br.	=39	11·6	
,, 3	30	T.120	,,	Bn.	35−1, 37+0·5	11·4	
,, 6	33	T.94	,,	Ni.	36−1, 38+0·5	11·4	
,, 17	44	,,	,,	,,	38−2, 50+2	11·8	
,, 18	45	160	,,	Br.	56+1	12·3	
,, 19	46	198	,,	F.G.B.	=56	12·4	
,, 26	53	160	,,	Br.	56−2, x+2	12·6	
,, 28	55	198	,,	F.G.B.	56−6, 60+1	13·0	
,, 28	55	T.94	,,	Ni.	44−3, x+5	12·2	
May 2	59	T.200	,,	Bn.	56−3, x+0·5	12·7	
,, 14	71	198	,,	F.G.B.	56−2, x+2	12·6	
,, 15	72	240	,,	Br.	x−2	13·0	
,, 20	77	T.94	,,	Ni.	=x	12·8	
,, 22	79	198	,,	F.G.B.	x−2, 60+1	13·0	
,, 24	81	,,	,,	,,	x−2·5, z+5	13·0	
,, 26	83	T.94	,,	Ni.	x+0·5	12·7	
,, 28	85	240	,,	Br.	x−4, z+4	13·2	
,, 29	86	T.200	,,	Bn.	60−2	13·3	
,, 29	86	200	,,	Bi.	=x	12·8	
June 3	91	,,	,,	,,	x−2	13·0	
,, 3	91	198	,,	F.G.B.	x−4, z+4	13·2	
,, 7	95	200	2	Bi.	x−4	13·2	
,, 10	9198	,,	,,	,,	x−3	13·1	
,, 14	9202	300	,,	,,	x−5, z+5	13·2	
,, 15	03	T.94	1	Ni.	x−5, z+2·5	13·3	
,, 16	04	300	,,	Bi.	x−6, z+4	13·3	
,, 18	06	240	,,	Br.	=z	13·5	About.
,, 24	12	198	,,	F.G.B.	=z	13·5	
July 2	20	T.94	,,	Ni.	=z	13·5	
,, 4	22	198	,,	F.G.B.	z−1, *a*+2	13·7	
,, 10	28	,,	2	,,	=*a*	13·9	Difficult.
,, 15	33	300	,,	Bi.	z−1	13·6	
,, 19	37	T.94	1	Ni.	z−0·5	13·6	
,, 20	9238	300	,,	Bi.	=z	13·5	

(7045) R CYGNI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
July 21	9239	240	1	Br.	z−3	13·8	Glimpsed.
,, 21	39	198	,,	F.G.B.	=a	13·9	
,, 24	42	300	,,	Bi.	=z	13·5	
,, 30	48	T.94	,,	Ni.	=z	13·5	
Aug. 3	52	240	,,	Br.	=z	13·5	
,, 14	63	198	,,	F.G.B.	=z	13·5	
,, 14	63	300	,,	Bi.	x−5	13·3	
,, 20	69	T.94	,,	Ni.	x−2, z+6	13·0	
,, 24	73	240	,,	Br.	x−3, z+5	13·1	
,, 24	73	300	,,	Bi.	59−2, x+1	12·5	
,, 24	73	198	,,	F.G.B.	=x	12·8	
,, 27	76	T.94	,,	Ni.	44−6, x+3·5	12·4	
Sept. 2	82	300	,,	Bi.	59+2	11·9	
,, 10	90	160	,,	Br.	=56	12·4	
,, 10	90	198	,,	F.G.B.	43−5, 56+1	12·3	
,, 15	95	60	,,	Gh.	=36	11·4	
,, 17	9297	160	,,	Br.	=36	11·4	
,, 21	9301	T.94	,,	Ni.	=25	10·5	Reddish orange.
,, 24	04	60	,,	Gh.	14−9, =32, 36+6	10·9	
,, 26	06	200	2	Bi.	14−5, 31+6	10·4	
,, 26	06	66	1	F.G.B.	=14	9·9	
,, 27	07	T.94	,,	Ni.	10−3, 14+1	9·8	
Oct. 1	11	T.50	,,	Bn.	=11	9·6	
,, 9	19	T.94	,,	Ni.	5−2, 10+3	9·3	In t.22, 9·6.
,, 10	20	45	,,	Br.	6−1, 11+4	9·2	
,, 17	27	30	2	Gh.	11+3, =6, 14+5·5	9·3	
,, 17	27	t.22	1	Ni.	3−4, 5+2·5	8·8	
,, 21	31	45	,,	F.G.B.	=4	8·6	
,, 23	33	35	3	La.	=k	8·0	
,, 25	35	45	1	Br.	=3, 4+3	8·4	
,, 25	35	T.50	,,	Bn.	3−1, 4+1·5	8·5	
,, 26	36	t.22	,,	Ni.	3−1, 5+6	8·5	
,, 30	40	t.30	,,	Bn.	2−13, 3+4·5	7·9	
,, 30	40	30	,,	Gh.	=4	8·6	
Nov. 5	46	t.22	,,	Ni.	2−8, A+3	7·5	Yellow.
,, 6	47	160	,,	Br.	2−2	6·8	
,, 6	47	45	,,	F.G.B.	=2	6·6	
,, 8	49	160	,,	Br.	=2	6·6	
,, 12	53	t.30	,,	Bn.	2−3·5, 3+14	7·0	
,, 12	53	30	,,	Gh.	=2	6·6	
,, 13	54	160	,,	Br.	2+1	6·5	
,, 15	56	45	,,	F.G.B.	2+5	6·1	
,, 20	61	60	,,	Br.	2+2	6·4	Very bright.
,, 21	62	T.50	,,	Bn.	2−2	6·8	
,, 21	62	t.22	,,	Ni.	2+3	6·3	Yellowish orange.
,, 25	66	T.50	,,	Bn.	2−2	6·8	
,, 29	70	,,	,,	,,	2−2, 3+15·5	6·8	Golden orange.
,, 29	70	45	,,	Br.	2+3	6·3	Very bright.
Dec. 1	72	25	3	La.	2−1	6·7	
,, 2	73	40	1	Gi.	=2	6·6	
,, 3	9374	45	,,	Br.	2+1	6·5	

(7045) R CYGNI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
Dec. 4	9375	45	1	F.G.B.	=2	6·6	
„ 5	76	T.25	„	Bn.	2−2	6·8	
„ 7	78	T.50	„	„	2−1	6·7	
„ 8	79	t.22	„	Ni.	2−1·5, A+10	6·8	Orange yellow.
„ 9	80	T.50	„	Bn.	2−2	6·8	
„ 9	80	30	„	Gh.	=2	6·6	
„ 11	82	45	„	F.G.B.	2+1	6·5	
„ 12	83	„	„	Br.	2+1	6·5	
„ 12	83	40	2	Gi.	d−2, f+1	6·8	
„ 15	86	T.25	1	Bn.	2+1	6·5	
„ 17	88	60	„	Br.	=2	6·6	
„ 17	88	25	„	La.	=2	6·6	
„ 17	88	40	2	Gi.	d−3, e+2	6·6	
„ 19	90	T.50	1	Bn.	2+1	6·5	
„ 19	90	25	2	La.	2−1	6·7	
„ 22	93	40	„	Gi.	=e, f+2	6·8	
„ 24	95	45	1	F.G.B.	2−1	6·7	
„ 24	95	t.22	2	Ni.	2−10, A+2	7·6	
„ 25	96	p.26	„	Bn.	2−2	6·8	p=2″ O.G.
„ 26	9397	40	1	Gi.	e−1, f+2	6·8	
„ 31	9402	„	„	„	e−1, f+1	6·9	
1912.							
Jan. 5	07	45	„	Br.	2−5	7·1	
„ 5	07	„	„	F.G.B.	2−3·5	7·0	
„ 7	09	t.22	„	Ni.	f−5, A+3	7·5	Orange yellow.
„ 8	10	40	„	Gi.	f−1, g+2	7·1	
„ 8	10	20	2	La.	2−12, 3+6	7·8	
„ 11	13	t.30	1	Bn.	2−10·5, 3+7	7·7	
„ 14	16	t.22	„	Ni.	A−2, 3+4	8·0	
„ 21	23	45	„	Br.	4−2	8·8	
„ 26	28	T.50	„	Bn.	2−15, 3+1	8·2	
„ 26	28	t.22	„	Ni.	A−4, 3+2	8·2	Orange.
„ 31	33	40	„	La.	4−1·5, 5+3	8·8	
Feb. 2	35	45	„	F.G.B.	=4	8·6	
„ 4	37	t.22	2	Ni.	3−3, 5+3·5	8·7	
„ 11	44	„	1	„	3−5, 5+2	8·9	
„ 15	48	40	„	La.	=5	9·1	
„ 16	49	„	2	„	=6	9·1	
„ 17	50	„	„	„	6−2, 11+2	9·4	
„ 20	53	„	1	„	6−3·5, 11+1	9·5	
„ 21	54	„	„	„	11−1, 14+1	9·8	
„ 21	54	t.22	„	Ni.	=5	9·1	
„ 28	61	40	„	La.	14+1	9·8	
Mar. 3	65	t.22	2	Ni.	5−2, =10	9·4	
„ 5	67	40	1	La.	14+1	9·8	
„ 6	68	160	„	Br.	14+1	9·8	
„ 7	69	132	„	F.G.B.	=14	9·9	
„ 8	70	40	„	La.	11−2, 14+0·5	9·8	
„ 11	73	„	„	„	=14	9·9	
„ 14	76	„	„	„	14+1	9·8	
„ 15	77	„	2	Gi.	11−2, 16+1	9·9	
„ 19	9481	„	„	La.	14−1	10·0	

(7045) R CYGNI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912. Mar. 19	9481	T.94	2	Ni.	=14	9·9	Yellowish orange. In t.22, 9·5.
„ 20	82	160	„	Br.	14−3	10·2	
„ 25	87	40	1	Gi.	11−2, 16+2	9·8	
„ 25	87	„	2	La.	14−1, 30+4	10·1	
„ 30	92	„	1	Gi.	11−2, 16+2	9·8	
„ 30	92	T.94	„	Ni.	14+2	9·7	
Apr. 3	96	40	2	Gi.	=16, 14+1	9·9	
„ 4	9497	„	„	La.	14−4, 30+2	10·3	
„ 8	9501	T.94	1	Ni.	14+0·5	9·8	
„ 11	04	40	„	La.	=31	10·9	
„ 16	09	160	„	Br.	=35, =36	11·4	
„ 19	12	132	„	F.G.B.	36−1, 43+2	11·5	
„ 20	13	40	2	La.	32−2, 36+1	11·2	
„ 20	13	T.94	1	Ni.	14−6·5, 31+4	10·5	
„ 22	15	40	„	Gi.	14−1	10·0	
„ 25	18	132	„	F.G.B.	36−2, 43+2	11·6	
„ 26	19	T.94	„	Ni.	=31	10·9	
„ 29	22	T.120	„	Bn.	35+1	11·2	
May 6	29	40	„	La.	36+1	11·3	
„ 10	33	T.94	2	Ni.	=36	11·4	
„ 10	33	40	„	La.	=36	11·4	
„ 11	34	„	„	Gi.	14−3	10·2	
„ 16	39	132	1	F.G.B.	=56	12·4	
„ 16	39	160	„	Br.	43−2, 59+2	11·9	
„ 16	39	T.94	„	Ni.	=38	11·6	
„ 20	43	198	„	F.G.B.	=56	12·4	
„ 24	47	120	2	Gh.	39−4, 56+4	12·0	
„ 26	49	T.94	„	Ni.	38−4, 50+2	11·9	
June 2	56	198	1	F.G.B.	56−4, 60+4	12·8	
„ 2	56	120	„	Gh.	=56	12·4	
„ 3	57	T.200	„	Bn.	56−3, x+1	12·7	
„ 4	58	40	2	La.	=59	12·1	
„ 6	60	160	„	Br.	59−2, x+4	12·3	
„ 6	60	132	1	F.G.B.	56−2·5, 60+5	12·6	
„ 6	60	T.94	„	Ni.	56−2, 59+1	12·3	
„ 10	64	120	„	Gh.	=56	12·4	
„ 18	72	198	„	F.G.B.	56−6, 60+1	13·0	
„ 18	72	T.94	„	Ni.	59−5·5, x+1	12·7	
„ 21	75	T.200	„	Bn.	x−1, 60+2	12·9	
„ 23	77	160	2	Br.	=x	12·8	About.
July 5	89	T.94	„	Ni.	x−2·5, z+5	13·0	
„ 10	94	„	„	„	x−4, z+4	13·2	
„ 15	9599	T.200	„	Bn.	60−4	13·5	About.
„ 23	9607	T.94	1	Ni.	x−5·5, z+2	13·3	
Aug. 9	24	„	2	„	x−5, z+2	13·3	
„ 14	29	„	„	„	=z	13·5	Difficult.
„ 29	44	240	„	Br.	=z	13·5	About. Glimpsed.
Sept. 4	50	„	„	„	z−3, a+2	13·8	
„ 5	9651	T.94	„	Ni.	=z	13·5	Glimpsed.

(7045) R CYGNI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Sept. 6	9652	300	3	Th.	α+1	13·8	
,, 11	57	T.94	2	Ni.	z−2·5	13·8	
,, 16	62	200	1	Th.	z−3, α+1	13·8	
,, 21	67	T.94	2	Ni.	z−2·5	13·8	
Oct. 3	79	,,	,,	,,	z−4	13·9	
,, 3	79	300	1	Th.	=α	13·9	
,, 10	86	240	,,	Br.	z−3, α+2	13·8	
,, 14	90	230	,,	Th.	z−2, α+2	13·7	
,, 17	9693	200	,,	Br.	=z	13·5	
,, 27	9703	300	2	Th.	x−4·5, z+3	13·2	
,, 29	05	200	1	Br.	x−6, z+2	13·4	
Nov. 1	08	300	,,	Th.	x−1·5, z+6	12·9	
,, 3	10	T.94	,,	Ni.	x−1·5, z+6	12·9	
,, 9	16	200	2	Br.	x−2, z+6	13·0	
,, 12	19	T.94	1	Ni.	=59	12·1	
,, 17	24	230	,,	Th.	56−3, x+1	12·7	
,, 24	31	T.94	2	Ni.	56−1, 59+2	12·2	
,, 26	33	300	1	Th.	59−1	12·2	
,, 29	36	T.120	,,	Bn.	41−1, =45	11·9	
,, 30	37	160	,,	Br.	=59	12·1	
,, 30	37	300	,,	Th.	=59	12·1	
Dec. 2	39	T.94	,,	Ni.	=38	11·6	
,, 5	42	40	2	La.	=36	11·4	
,, 6	43	79	1	Ma.	14−7	10·6	Red.
,, 8	45	230	,,	Th.	=36	11·4	
,, 9	46	40	2	La.	32−2, 36+2	11·2	
,, 9	46	T.94	1	Ni.	36−1, 38+2	11·4	
,, 11	48	40	2	La.	32−2, 36+2	11·2	
,, 12	49	79	1	Ma.	14−3, =32	10·6	About.
,, 12	49	T.120	,,	Bn.	31−3, 35+1	11·2	
,, 15	52	40	2	La.	=32	11·0	Difficult.
,, 16	53	160	1	Br.	14−2	10·1	
,, 16	53	T.120	,,	Bn.	29−2, 31+0·5	10·9	
,, 16	53	79	,,	Ma.	31−2, 36+2	11·2	
,, 16	53	120	,,	Th.	14−5, 32+5	10·4	
,, 16	53	T.94	,,	Ni.	25−1·5, 31+3	10·6	
,, 18	55	T.120	,,	Bn.	29−1, 31+1	10·8	
,, 18	55	230	,,	Th.	14−1	10·0	
,, 20	57	40	,,	Gi.	=14	9·9	
,, 23	60	160	,,	Br.	14+2	9·7	
,, 28	65	,,	,,	,,	5−1, 6+1	9·1	
,, 29	66	T.50	,,	Bn.	5−0·5, =6	9·1	
,, 29	66	50	,,	Ma.	5−2, 10+2	9·3	Red.
,, 29	66	60	,,	Th.	=6, 11+4	9·2	
,, 29	66	T.94	,,	Ni.	5−1	9·2	In t.22, 9·3.
,, 31	68	40	,,	Gi.	=m, 6+2·5	8·8	
,, 31	68	60	,,	Th.	5+1	9·0	
1913.							
Jan. 1	69	T.50	,,	Bn.	=5, =6	9·1	
,, 5	73	,,	,,	,,	4−3, 5+1	8·9	
,, 5	9773	50	,,	Ma.	5+2	8·9	Very red.

(7045) R CYGNI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Jan. 5	9773	60	2	Th.	=4	8·6	
,, 6	74	40	,,	Gi.	l−2, m+3	8·5	
,, 6	74	,,	1	La.	4−4, 6+2	9·0	
,, 8	76	t.22	,,	Ni.	3−3, 5+3	8·7	
,, 9	77	T.50	2	Bn.	4−3, 5+1·5	8·9	
,, 12	80	,,	1	,,	=4, 5+3	8·7	
,, 16	84	t.22	,,	Ni.	3−3, 5+3	8·7	
,, 22	90	40	,,	Gi.	h−3, k+1	7·9	
,, 23	91	,,	,,	La.	=3	8·4	
,, 25	93	45	,,	Br.	3+1, 4+4	8·3	
,, 26	94	T.50	,,	Bn.	3+2, 4+2	8·3	
,, 26	9794	t.22	,,	Ni.	3+1	8·3	
Feb. 2	9801	T.50	,,	Bn.	2−14, 3+3·5	8·0	
,, 3	02	40	2	Gi.	h−3, k+1	7·9	
,, 6	05	t.22	,,	Ni.	A−3, 3+3	8·1	
,, 8	07	62	,,	Th.	2−13, 3+4·5	7·9	
,, 9	08	40	,,	Gi.	h−3, k+2	7·8	
,, 9	08	,,	1	La.	=3	8·4	
,, 13	12	20	,,	,,	=3	8·4	
,, 15	14	,,	,,	,,	=k	8·0	
,, 15	14	t.22	,,	Ni.	A+1	7·7	
,, 16	15	T.25	,,	Bn.	2−14, 3+3·5	8·0	
,, 18	17	,,	,,	,,	2−14, 3+3·5	8·0	
,, 20	19	,,	,,	,,	2−14·5, 3+3	8·1	
,, 20	19	45	2	Br.	3+1	8·3	About.
,, 22	21	T.25	1	Bn.	2−14, 3+3·5	8·0	
,, 26	25	37	2	Th.	2−11, 3+6·5	7·7	
Mar. 1	28	t.22	,,	Ni.	=A	7·8	
,, 2	29	T.25	1	Bn.	3+1	8·3	
,, 3	30	20	,,	La.	=3	8·4	
,, 7	34	45	,,	Br.	=4	8·6	
,, 11	38	t.30	,,	Bn.	=3	8·4	
,, 11	38	40	2	La.	3−2·5, 6+5	8·6	
,, 11	38	37	,,	Th.	3−2, 4+0·5	8·6	
,, 14	41	,,	,,	,,	=3	8·4	
,, 15	42	t.22	1	Ni.	A−4, 3+1	8·3	
,, 23	50	,,	,,	,,	A−4, 3+2	8·2	
,, 30	57	45	,,	Br.	4−3, 5+1	8·9	
,, 30	57	t.60	,,	Bn.	4−3, 5+1	8·9	
Apr. 4	62	37	,,	Th.	=5	9·1	Red.
,, 5	63	,,	,,	,,	=6	9·1	
,, 7	65	t.22	,,	Ni.	3−4, 5+3	8·8	
,, 12	70	62	,,	Th.	5+0·5	9·0	
,, 15	73	40	,,	La.	3−6, 6+1·5	9·0	
,, 16	74	62	2	Th.	4−4, 5+1	9·0	
,, 17	75	,,	1	,,	=5	9·1	Red.
,, 20	78	t.22	2	Ni.	5−2, 10+2	9·3	Difficult.
,, 27	85	45	1	Br.	6−4, 11+1	9·5	
,, 28	86	40	2	La.	11−3, 14+1	9·9	
,, 28	86	62	,,	Th.	=13	9·5	
,, 29	9887	T.94	1	Ni.	=10	9·6	In t.22, 9·9.

(7045) R CYGNI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
May 1	9889	T.50	1	Bn.	8−2, 9−1, 14+1, 16+4	9·7	
„ 1	89	62	2	Th.	11−1, 14+1	9·8	
„ 2	90	60	1	Gh.	=14	9·9	
„ 2	90	120	„	Th.	13−2, 14+2	9·7	
„ 6	94	40	„	La.	14+1	9·8	Orange red.
„ 9	97	120	„	Br.	14+1	9·8	
„ 10	98	T.50	„	Bn.	=14	9·9	
„ 11	99	60	„	Gh.	=14	9·9	
„ 11	9899	T.94	„	Ni.	10−2, 14+2	9·7	
„ 12	9900	40	„	Gi.	6−3, 11+1·5	9·5	
„ 13	01	T.50	„	Bn.	11−2, 13−3, =14, 16+2	9·8	
„ 13	01	79	„	Ma.	=11, 14+1·5	9·7	
„ 16	04	30	„	Gh.	=14	9·9	
„ 16	04	79	„	Ma.	11−1, 14+1	9·8	
„ 16	04	120	„	Th.	14+2	9·7	
„ 18	06	40	„	La.	14−1	10·0	
„ 21	09	120	„	Th.	11−2, 14+1	9·8	
„ 22	10	40	„	La.	=14	9·9	
„ 24	12	T.95	„	Bn.	23−1, 30+0·5	10·5	
„ 24	12	40	„	La.	14−1	10·0	
„ 24	12	79	„	Ma.	14+1	9·8	Red.
„ 24	12	120	„	Th.	14+0·5	9·8	
„ 25	13	160	„	Br.	=14	9·9	
„ 25	13	60	„	Gh.	=30	10·5	
„ 25	13	79	„	Ma.	=14	9·9	
„ 25	13	40	„	Gi.	=14	9·9	
„ 25	13	T.94	„	Ni.	14+1	9·8	
„ 28	16	40	2	La.	14−1	10·0	
„ 30	18	T.95	1	Bn.	23−1, 30+0·5	10·5	
„ 30	18	60	„	Gh.	=30	10·5	
„ 30	18	62	„	Th.	14−1, 16+1	10·0	Very red.
„ 31	19	79	„	Ma.	14−1	10·0	
„ 31	19	120	„	Th.	=31	10·9	
June 1	20	40	„	La.	14−2	10·1	
„ 2	21	T.120	„	Bn.	29−1, 31+1	10·8	
„ 2	21	79	„	Ma.	14−1·5, =29	10·4	
„ 2	21	T.94	„	Ni.	=14	9·9	
„ 3	22	62	2	Th.	=31	10·9	
„ 5	24	40	„	La.	14−4	10·3	
„ 7	26	160	1	Br.	=14	9·9	
„ 7	26	34	2	Cr.	14−1	10·0	
„ 8	27	60	1	Gh.	=30	10·5	
„ 8	27	79	„	Ma.	14−2, 29−1, 31+1	10·6	
„ 9	28	40	2	Gi.	=30	10·5	
„ 10	29	79	„	Ma.	=31, =32	11·0	
„ 12	31	40	„	La.	14−6	10·5	
„ 14	33	T.94	1	Ni.	25−3, 31+1·5	10·8	
„ 15	34	34	2	Cr.	14−3	10·2	
„ 15	34	79	1	Ma.	31−0·5, =32	11·0	
„ 21	40	40	2	La.	32−2, 36+1	11·2	
„ 23	42	79	1	Ma.	=33	11·1	About.
„ 27	46	„	„	„	=32	11·0	
„ 28	47	140	2	Th.	=35, 36−2	11·5	
„ 29	9948	30	1	Gh.	=31, =32	11·0	

(7045) R CYGNI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
July 3	9952	T.120	1	Bn.	=39, 41+0·5	11·7	
„ 8	57	155	„	Th.	43−4, 56+1	12·2	
„ 8	57	T.94	2	Ni.	50−2, 56+2	12·2	
„ 13	62	183	„	Ma.	=39, 56+2	11·9	
„ 16	65	300	1	Th.	56+2	12·2	
„ 16	65	T.94	2	Ni.	50−2, 56+1	12·3	
„ 22	71	300	„	Th.	56+1	12·3	
„ 27	76	155	„	„	56−2	12·6	
Aug. 1	81	120	1	Br.	56−2, x+2	12·6	
„ 2	82	155	„	Th.	56−3, x+1	12·7	
„ 12	9992	T.94	„	Ni.	x−1·5, z+6	12·9	
„ 22	0002	„	„	„	x+1	12·7	
„ 23	03	160	2	Br.	x−3	13·1	About.
„ 23	03	230	1	Th.	x−2, z+6	13·0	
„ 27	07	T.94	„	Ni.	=x	12·8	
Sept. 3	14	210	2	Th.	x−2·5, z+6	13·0	Unsatisfactory.
„ 6	17	120	„	„	x−6, z+2·5	13·3	
„ 6	17	T.94	1	Ni.	x−4·5, z+3	13·2	
„ 7	18	120	„	Br.	x−5, z+3	13·3	
„ 7	18	T.200	2	Bn.	=60	13·1	
„ 7	18	183	1	Ma.	z+2	13·3	
„ 11	22	T.94	2	Ni.	x−4, z+3	13·2	Difficult.
„ 12	23	183	„	Ma.	x−5	13·3	
„ 14	25	120	1	Th.	x−6, z+2·5	13·3	
„ 20	31	183	2	Ma.	x−4	13·2	
„ 24	35	120	„	Br.	=z	13·5	About.
„ 24	35	183	1	Ma.	x−5, =z	13·4	
„ 24	35	300	„	Tn.	x−7, z+1	13·5	
„ 24	35	210	„	Th.	z+1	13·4	
„ 24	35	T.94	„	Ni.	=z	13·5	
„ 26	37	183	„	Ma.	=z	13·5	About.
„ 27	38	240	„	Br.	=z	13·5	
„ 27	38	300	2	Th.	z+2	13·3	
„ 30	41	183	„	Ma.	=z	13·5	About.
Oct. 6	47	210	1	Th.	z−2, α+2	13·7	
„ 9	50	T.94	„	Ni.	z−1	13·6	
„ 9	50	210	„	Th.	z−3, α+1	13·8	
„ 14	55	„	2	„	z−2	13·7	Difficult.
„ 17	58	300	„	„	<z	<13·5	Not seen.
„ 20	61	120	1	Br.	<z	<13·5	„ „
„ 25	66	T.94	„	Ni.	z−2·5	13·8	
„ 31	72	120	„	Br.	z−3	13·8	About.
„ 31	72	300	2	Th.	α+1·5	13·8	
Nov. 3	75	„	„	„	z−2, α+2	13·7	
„ 5	77	210	1	„	z−3, α+1	13·8	
„ 12	84	230	2	„	z−2	13·7	Difficult.
„ 17	89	600	1	„	z−0·5	13·6	
„ 19	91	T.94	„	Ni.	z+0·5	13·5	
„ 21	93	210	2	Th.	z+1	13·4	
„ 22	0094	120	1	Br.	z−1	13·6	

(7045) R CYGNI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Nov. 22	0094	210	2	Th.	x−4	13·2	
,, 23	95	T.94	1	Ni.	x−6, z+2	13·4	
,, 26	0098	150	,,	Tn.	=60	13·1	
,, 28	0100	T.150	,,	Bn.	60−1	13·2	About.
Dec. 4	06	120	,,	Br.	x−2·5, z+5	13·0	
,, 4	06	150	,,	Tn.	56−5, 60+2	12·9	
,, 5	07	,,	2	,,	56−4, 60+4	12·8	
,, 5	07	155	1	Th.	x−1, 60+3	12·9	
,, 6	08	210	,,	,,	x+1	12·7	
,, 7	09	T.94	2	Ni.	x+1	12·7	
,, 9	11	210	1	Th.	x+1	12·7	
,, 10	12	155	,,	,,	x−1	12·9	
,, 12	14	300	,,	,,	56−2, x+2	12·6	
,, 12	14	150	,,	Tn.	59−3, x+3	12·4	
,, 14	16	T.167	,,	Bn.	56−3, x+1	12·7	
,, 16	18	150	,,	Tn.	59−0·5, 56+2	12·2	
,, 16	18	155	2	Th.	56−2, x+2	12·6	
,, 18	20	T.200	1	Bn.	56−2, x+2	12·6	
,, 18	20	150	,,	Tn.	36−6, 59+1	12·0	
,, 18	20	183	,,	Ma.	56+0·5	12·3	
,, 18	20	T.94	,,	Ni.	56+0·5	12·3	
,, 21	23	40	,,	La.	36−4	11·8	
,, 21	23	155	,,	Th.	56−1	12·5	
,, 23	25	120	,,	,,	43−1	11·9	
,, 24	26	160	,,	Br.	43−2, 59+2	11·9	
,, 24	26	150	,,	Tn.	36−5, 59+2	11·9	
,, 28	30	,,	,,	,,	36−3, 59+3	11·7	
,, 28	30	T.150	,,	Bn.	=45, 59+1	12·0	
,, 28	30	145	2	Th.	=43	11·8	
,, 28	30	T.94	1	Ni.	36−1, =38	11·5	
,, 30	32	150	,,	Tn.	36−2, 59+5	11·6	
,, 30	32	183	,,	Ma.	=35	11·3	About.
,, 31	33	T.150	,,	Bn.	41−1, 45+1	11·8	
,, 31	33	150	,,	Tn.	36−3, 43+1	11·7	
1914.							
Jan. 2	35	160	,,	Br.	35−2, 41+2	11·5	
,, 3	36	145	2	Th.	36−2, 43+2	11·6	
,, 4	37	,,	1	,,	36−2	11·6	
,, 5	38	T.150	,,	Bn.	35−2, 41+2	11·5	
,, 5	38	T.94	,,	Ni.	31−2, 36+2	11·2	
,, 6	39	157	,,	Th.	=32	11·0	
,, 6	39	60	2	Tn.	31−4, 36+1	11·3	
,, 11	44	T.94	1	Ni.	14−3·5, 31+7	10·2	
,, 14	47	60	,,	Tn.	=32	11·0	
,, 15	48	40	2	La.	=31, 32+1	10·9	Difficult.
,, 17	50	60	1	Tn.	31−0·5, =32	11·0	
,, 18	51	183	,,	Ma.	14−1·5	10·0	
,, 20	53	T.94	,,	Ni.	14+1	9·8	
,, 22	55	183	,,	Ma.	14−1	10·0	
,, 23	56	160	,,	Br.	14−3	10·2	
,, 23	56	T.95	,,	Bn.	14−1	10·0	
,, 25	58	40	2	La.	14−3, 30+3	10·2	
,, 26	0159	62	,,	Th.	13−1, 14+3·5	9·6	

(7045) R CYGNI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Jan. 26	0159	60	1	Tn.	14−1·5, 30+5	10·0	
„ 30	63	183	„	Ma.	14+2	9·7	
„ 30	63	T.94	„	Ni.	=10	9·6	In t.22, 9·7.
Feb. 1	65	60	„	Th.	6−2, 11+2	9·4	
„ 3	67	40	„	La.	6−2, =11, 14+4	9·5	
„ 5	69	„	„	„	5+1, 6+1, 11+3, 14+6	9·2	
„ 8	72	„	2	Th.	4−2, 5+2	8·8	
„ 12	76	t.22	1	Ni.	3−2·5, 5+4	8·6	
„ 15	79	45	„	Br.	3−2, 4+1	8·6	
„ 15	79	T.50	„	Bn.	4−2, 5+2	8·8	
„ 16	80	40	„	Th.	=3	8·4	
„ 22	86	„	2	„	3+3	8·1	
„ 22	86	T.50	1	Bn.	2−14, 3+3·5	8·0	
Mar. 1	0193	t.22	„	Ni.	f−6, A+2	7·6	Yellow.
„ 12	0204	„	„	„	=f	7·0	
„ 16	08	160	2	Br.	2−3	6·9	
„ 21	13	T.25	1	Bn.	2−2, 3+15·5	6·8	
„ 22	14	t.22	„	Ni.	f−3, A+6	7·3	Orange yellow.
„ 24	16	75	„	La.	d−2, g+4	6·7	
„ 27	19	45	„	Br.	2−5, 3+8	7·4	
„ 27	19	T.25	„	Bn.	2−2, 3+15·5	6·8	
„ 31	23	„	„	„	2−2, 3+15·5	6·8	
„ 31	23	20	„	La.	d−2, f−2, g+6	6·8	
Apr. 6	29	„	„	„	d−4, =f, g+4	6·9	
„ 10	33	„	„	„	d−4, =f, g+4	6·9	Orange.
„ 11	34	„	„	„	d−5, =f, g+2	7·0	„
„ 12	35	t.22	„	Ni.	f−6, A+3	7·6	
„ 14	37	20	„	La.	f−3, =g, h+3	7·3	Orange.
„ 17	40	„	2	„	f−2, =g, h+2	7·3	Difficult.
„ 18	41	t.22	1	Ni.	f−5, A+3	7·5	
„ 22	45	20	„	La.	f−2, g+2	7·1	
„ 25	48	T.50	„	Bn.	2−13, 3+4·5	7·9	
„ 25	48	30	„	Gh.	=4	8·6	
„ 26	49	45	„	Br.	3+2	8·2	
„ 28	51	t.30	„	Bn.	2−13·5, 3+4	8·0	
„ 28	51	20	„	La.	=g, h+2	7·3	
May 3	56	„	„	„	f−3, =g, h+3	7·3	
„ 15	68	t.22	„	Ni.	A−4, 3+2	8·2	
„ 16	69	45	„	Br.	3−2, 4+1	8·6	
„ 16	69	T.50	„	Bn.	2−14·5, 3+3	8·1	
„ 16	69	30	„	Gh.	=4	8·6	
„ 21	74	„	„	„	=4	8·6	
„ 21	74	40	„	La.	h−3, =k, 3+4	7·9	
„ 24	77	T.50	„	Bn.	3−1, 5+5·5	8·5	
„ 26	79	„	„	„	3−1, 4+2	8·5	
„ 26	79	45	„	Br.	=4	8·6	
„ 30	83	t.22	„	Ni.	3−3, 5+3	8·7	Yellowish orange.
June 4	88	T.50	„	Bn.	3−1·5, 4+1	8·5	
„ 4	88	40	2	Th.	4+2	8·4	
„ 6	0290	t.22	1	Ni.	3−3, 5+3	8·7	

(7045) R CYGNI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
June 8	0292	40	1	Th.	4+2	8·4	
,, 9	93	,,	2	La.	3−2, 6+5	8·6	
,, 13	97	45	1	Br.	=4	8·6	
,, 13	97	60	,,	Th.	4+3	8·3	
,, 14	0298	T.50	,,	Bn.	4−3, 5+1·5	8·9	
,, 16	0300	40	,,	La.	6+2, 11+4	9·1	
,, 17	01	,,	2	Th.	4−2, 5+2	8·8	
,, 21	05	T.50	1	Bn.	=5, 6+0·5	9·1	
,, 23	07	60	,,	Tn.	=5	9·1	
,, 24	08	40	2	La.	6+2, =8, =11	9·3	
,, 25	09	30	,,	Tn.	4−4, 5+1	9·0	
,, 25	09	60	1	Th.	4−3, 5+1	8·9	
,, 27	11	45	,,	Br.	=5, =6	9·1	
,, 27	11	40	,,	La.	6+2, =11, 14+4	9·4	
,, 28	12	79	2	Ma.	6+1, 14+5	9·2	
,, 28	12	T.50	1	Bn.	6−1·5, 9+3	9·3	
,, 29	13	79	,,	Ma.	=6	9·1	
,, 29	13	t.22	,,	Ni.	5−5, 14+3·5	9·5	
,, 29	13	60	,,	Th.	5+2	8·9	
,, 30	14	79	,,	Ma.	14+3	9·6	
July 3	17	40	,,	Th.	4−1	8·7	
,, 3	17	30	,,	Tn.	=5	9·1	
,, 4	18	T.50	,,	Bn.	4−3, =5	9·0	
,, 4	18	40	2	Bc.	6−3, 11+2	9·4	
,, 6	20	79	1	Ma.	6−4, 11+1	9·5	
,, 7	21	T.94	2	Ni.	=10	9·6	
,, 9	23	T.50	1	Bn.	6−1·5, 9+3	9·3	
,, 9	23	30	,,	Tn.	6−2, 11+2	9·4	
,, 10	24	40	,,	Bc.	11−2, 14+2	9·8	
,, 10	24	79	,,	Ma.	6−4, 11+1, 14+3	9·6	
,, 12	26	,,	,,	,,	6−4, 11+0·5	9·6	
,, 13	27	40	,,	La.	6−4, 14+1	9·7	Orange.
,, 17	31	T.50	,,	Bn.	11−2, =13, 14+1	9·7	
,, 17	31	40	,,	Bc.	11−2, 14+2	9·8	
,, 17	31	T.94	,,	Ni.	14+2	9·7	
,, 24	38	40	2	La.	14−4, 30+2	10·3	
,, 27	41	T.94	1	Ni.	14+1	9·8	
,, 30	44	157	,,	Th.	14+2	9·7	
Aug. 3	48	160	,,	Br.	=14	9·9	
,, 3	48	157	,,	Th.	14−1·5	10·0	
,, 7	52	62	2	,,	=30	10·5	
,, 7	52	40	1	Bc.	14−5, 31+4	10·5	
,, 10	55	T.94	,,	Ni.	=14	9·9	
,, 11	56	157	,,	Th.	31+1·5	10·8	
,, 12	57	40	,,	La.	14−6, =31	10·7	
,, 14	59	T.95	,,	Bn.	31−3, 35+1	11·2	
,, 14	59	157	,,	Th.	36−1	11·5	
,, 17	62	60	,,	Tn.	=32	11·0	
,, 18	63	T.94	2	Ni.	14−6, 31+4·5	10·5	
,, 21	66	160	1	Br.	35−2, 39+2	11·5	
,, 21	66	157	,,	Th.	36−2	11·6	
,, 24	69	,,	,,	,,	36+2	11·2	
,, 26	71	T.120	,,	Bn.	=39	11·6	
,, 26	0371	40	,,	La.	35−2, 43+3	11·5	

(7045) R CYGNI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Aug. 26	0371	60	1	Tn.	=39	11·6	
" 27	72	157	2	Th.	43+2	11·6	
" 30	75	T.150	1	Bn.	35−2, =39	11·6	
Sept. 1	77	T.94	"	Ni.	=36, 38+4	11·3	
" 5	81	157	"	Th.	36−3, 43+1	11·7	
" 8	84	T.150	"	Bn.	41−1, =45	11·9	
" 10	86	120	"	Br.	59−3, x+3	12·4	
" 10	86	157	"	Th.	56+2, 59+3	12·0	
" 11	87	T.94	"	Ni.	38−1·5, 50+3	11·8	
" 15	91	40	2	La.	36−3, 43+2	11·6	
" 15	91	157	1	Th.	56+3, 59+2	12·0	
" 19	95	150	"	Tn.	=59	12·1	
" 23	99	120	"	Br.	x+1	12·7	
" 23	0399	T.94	"	Ni.	50−2, 56+2	12·2	
" 24	0400	114	"	Th.	56−2, 59−1	12·4	
" 24	00	T.200	"	Bn.	=56	12·4	
" 29	05	150	"	Tn.	=56	12·4	
" 30	06	157	"	Th.	59−3, x+3	12·4	
Oct. 3	09	"	"	"	56−1, x+2	12·5	
" 10	16	"	2	"	x+2	12·6	
" 11	17	T.94	1	Ni.	=x	12·8	
" 12	18	120	"	Br.	=x	12·8	
" 18	24	150	"	Tn.	=x	12·8	
" 20	26	"	2	"	=x	12·8	
" 21	27	157	1	Th.	=x	12·8	R. quite sharp.
" 23	29	"	"	"	=x	12·8	
" 24	30	150	2	Tn.	=x	12·8	
" 26	32	157	1	Th.	x−2	13·0	
Nov. 7	44	240	2	Br.	=z	13·5	About. Difficult.
" 7	44	157	1	Th.	x−5	13·3	
" 7	44	150	2	Tn.	x−2, 60+2	13·0	
" 12	49	T.94	1	Ni.	x−5, z+2·5	13·3	
" 13	50	250	"	Th.	x−4, z+4	13·2	
" 14	51	120	"	Br.	=z	13·5	
" 16	53	T.200	"	Bn.	=60	13·1	
" 17	54	157	"	Th.	x−4, z+4	13·2	
" 21	58	"	"	"	z+3	13·2	
" 22	59	T.94	2	Ni.	x−6, z+2	13·4	
" 23	60	220	1	Th.	z+4	13·1	
" 23	60	210	"	Tn.	x−6, z+1	13·4	12½″.
" 27	64	120	2	Br.	=z	13·5	About.
Dec. 7	74	157	"	Th.	z−1	13·6	
" 8	75	220	1	"	=z	13·5	Very difficult.
" 14	81	T.94	2	Ni.	z−1·5	13·7	Uncertain.
" 20	87	"	1	"	x−6·5, z+1	13·4	
" 20	87	220	"	Th.	z−1	13·6	Very difficult.
" 29	0496	"	2	"	=z	13·5	" "

(7120) χ CYGNI.

H.D. 194632.

NOTES.

Star B unidentified, 13·4 m. estimated. $\Delta\alpha + 8^s$, $\Delta\delta + 1'\cdot5$.
,, R = φ Cygni, 4·74 m. P.D.M.
,, S = F8 ,, 4·90 m. ,,

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Jan. 3	8675	160	1	Br.	=104	12·7	
,, 10	82	,,	2	,,	=104	12·7	
,, 10	8682	T.94	1	Ni.	87−2·5, =92	12·2	
Feb. 8	8711	,,	,,	,,	=87	11·9	
,, 12	15	,,	,,	,,	62−3, 67+0·5	11·3	
,, 21	24	,,	,,	,,	62−1·5, 67+2	11·1	
,, 27	30	,,	,,	,,	=62	11·0	
Mar. 5	36	,,	,,	,,	62−1	11·1	
,, 14	45	,,	,,	,,	=51, 62+1	10·7	
,, 22	53	,,	,,	,,	34−3, 51+1·5	10·4	
,, 30	61	,,	,,	,,	20−5, 34+1·5	9·9	
,, 31	62	160	2	Br.	27−3, 51+3	10·2	
Apr. 11	73	T.94	1	Ni.	=34	10·1	
,, 21	83	,,	,,	,,	20−5, 34+1	9·9	
,, 23	85	160	2	Br.	=27	9·9	
May 2	94	T.94	1	Ni.	20−4·5, 34+3	9·8	Orange.
,, 7	99	,,	,,	,,	20−3, 34+3	9·7	
,, 7	8799	160	,,	Br.	20−2, 27+2	9·6	
,, 10	8802	,,	2	,,	=34	10·1	Doubtful. [C.L.B.]
,, 15	07	T.50	1	Bn.	=13	8·7	
,, 16	08	50	,,	Ma.	=14	9·0	
,, 18	10	60	,,	Br.	6−5, 7+1	8·0	
,, 20	12	t.22	,,	Ni.	7−3, 13+3	8·4	
,, 22	14	60	,,	Br.	6−2	7·7	
,, 27	19	,,	,,	,,	3−3, 6+6	6·8	
June 2	25	B.	,,	,,	1−4, g+1	5·5	
,, 2	25	t.22	,,	Ni.	g−4, 3+5	5·9	Yellow.
,, 3	26	B.	,,	,,	g−5, 3+4	6·0	
,, 3	26	50	,,	Ma.	1−9, 3+4·5	6·0	
,, 6	29	B.	,,	Ni.	g−2, 3+6·5	5·7	
,, 9	32	,,	,,	,,	1−4, =g	5·5	
,, 13	36	,,	,,	Br.	1−1, g+4	5·2	
,, 13	36	50	,,	Ma.	1+1	5·0	
,, 14	37	B.	,,	Br.	=1	5·1	
,, 15	38	,,	,,	Bn.	1−4, g+1	5·5	Bright yellow.
,, 17	40	,,	,,	Ni.	1−4, g+1	5·5	
,, 17	40	F.	,,	Ma.	1−4, h+2	5·5	
,, 18	41	B.	,,	Br.	1−1, g+4	5·2	
,, 18	8841	,,	,,	Bn.	1−4, g+1	5·5	

(7120) χ CYGNI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
June 19	8842	B.	1	Br.	1−3, g+2	5·4	
„ 19	42	F.	„	Ma.	1−2, h+4	5·3	
„ 20	43	B.	„	Bn.	1−3·5, g+1	5·4	
„ 20	43	„	„	Ni.	1−3, g+1	5·4	
„ 22	45	F.	„	Ma.	1−4, h+2	5·5	
„ 25	48	B.	„	Br.	1−3, g+2	5·4	
„ 26	49	„	„	Ni.	1−3, g+2	5·4	
„ 26	49	F.	„	Ma.	1−5·5, h+1	5·6	
„ 28	51	B.	„	Bn.	1−3·5, g+1	5·4	
„ 29	52	„	„	Ni.	1−2, g+2	5·3	
July 1	54	B.	„	Ni.	1−3, g+2	5·4	Yellow.
„ 3	56	„	„	Br.	1−3, g+2	5·4	
„ 4	57	F.	2	Ma.	1−3, h+3	5·4	Pale yellow.
„ 7	60	B.	1	Ni.	1−3, g+2	5·4	Orange yellow.
„ 10	63	„	„	„	1−3, g+1	5·4	
„ 11	64	„	„	Br.	1−3, g+2	5·4	
„ 11	64	„	„	Bn.	1−3·5, g+1	5·4	
„ 11	64	F.	„	Ma.	=h	5·7	
„ 12	65	„	„	„	1−5·5, h+1	5·6	
„ 13	66	B.	„	Bn.	1−4, g+1	5·5	
„ 16	69	„	„	Ni.	1−3, g+1	5·4	
„ 22	75	F.	„	Ma.	=h	5·7	
„ 23	76	B.	„	Bn.	1−4, g+1	5·5	
„ 25	78	„	„	„	1−4, g+0·5	5·5	
„ 25	78	F.	„	Ma.	h+1	5·6	
„ 27	80	B.	„	Ni.	1−4, =g	5·5	
„ 29	82	„	„	„	1−4, =g	5·5	
„ 31	84	„	„	Br.	g−1, 2+4	5·7	
„ 31	84	F.	„	Ma.	=h	5·7	
„ 31	84	B.	„	R.B.	g−1, h+1	5·6	
Aug. 2	86	„	„	„	g−1·5, h+1	5·7	
„ 2	86	F.	„	Ma.	=h	5·7	Pale red.
„ 2	86	B.	„	Ni.	g−1, 3+7	5·7	
„ 4	88	F.	„	Ma.	h−3, 3+3	6·1	
„ 5	89	B.	„	Br.	g−2, 2+3	5·8	
„ 6	90	„	„	R.B.	g−1·5, h+1	5·7	
„ 6	90	F.	„	Ma.	h−4, 3+2	6·2	
„ 7	91	„	„	„	3+1	6·3	
„ 8	92	B.	„	Br.	g−3, 2+2	5·9	
„ 8	92	„	„	Bd.	=3	6·4	
„ 8	92	„	„	Bn.	1−4, =g	5·5	
„ 9	93	„	„	Bd.	3−1, n+4	6·5	
„ 9	93	t.22	„	Ni.	g+3	5·3	In B. 6·5.
„ 10	94	B.	„	R.B.	2−1, 3+1	6·2	
„ 10	94	60	„	Gh.	3−5, 6+7	6·9	
„ 10	94	F.	„	Ma.	3+0·5	6·4	
„ 12	96	„	„	„	3+1	6·3	
„ 12	96	B.	„	Br.	=2	6·1	
„ 13	97	t.22	„	Ni.	=g	5·6	In B. 6·5.
„ 15	99	F.	„	Ma.	=2, 3+2	6·1	
„ 15	8899	B.	2	Bd.	3−4, n+2	6·8	
„ 16	8900	„	„	„	=n	6·9	
„ 19	03	60	„	Gh.	3−5, =4, 5+5	6·9	
„ 19	8903	F.	1	Ma.	2−1·5	6·2	

(7120) χ CYGNI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Aug. 19	8903	t.22	1	Ni.	3−1·5, 0+8	6·5	Yellowish orange.
,, 20	04	B.	,,	Br.	=3	6·4	
,, 20	04	,,	,,	Bn.	n−1	7·0	
,, 22	06	30	,,	Bd.	n−3, 6+3	7·2	
,, 24	08	,,	,,	,,	n−4, 6+2	7·3	
,, 26	10	F.	,,	Ma.	2−3, 3−4	6·6	Orange red.
,, 26	10	30	,,	Bd.	n−4, 6+2	7·3	
,, 31	15	,,	,,	,,	n−4, 6+1	7·4	
,, 31	15	45	,,	Br.	3−6, 6+6	7·0	
Sept. 1	16	t.30	,,	Bn.	6+1·5	7·4	
,, 1	16	t.22	2	Ni.	3−6, 0+3	7·0	
,, 2	17	30	1	Bd.	n−5, 6+1	7·4	
,, 3	18	50	,,	Ma.	6+1	7·4	
,, 3	18	60	2	Gh.	=6	7·5	
,, 6	21	30	1	Bd.	=6	7·5	
,, 8	23	45	,,	Br.	=6	7·5	
,, 8	23	t.30	,,	Bn.	6−1, 7+5	7·6	
,, 9	24	45	,,	F.G.B.	6−2, 7+4	7·7	
,, 9	24	30	,,	Bd.	=6	7·5	
,, 11	26	50	,,	Ma.	6−4·5, 7+1	8·0	
,, 12	27	45	,,	F.G.B.	6−5, 7+1	8·0	
,, 16	31	,,	,,	Br.	6−2, 7+3	7·8	
,, 19	34	T.50	2	Bn.	7−1	8·2	Uncertain.
,, 19	34	30	,,	Bd.	=7	8·1	
,, 20	35	,,	1	,,	7−4, 13+1·5	8·5	
,, 20	35	45	2	F.G.B.	7−3, 13+3	8·4	
,, 20	35	t.22	1	Ni.	7−3, 13+2	8·4	
,, 22	37	30	,,	Bd.	13−3, 18+3	9·0	
,, 24	39	,,	,,	,,	13−4, 18+2	9·1	
,, 24	39	t.30	,,	Bn.	7−4, 13+1·5	8·5	
,, 25	40	t.22	,,	Ni.	=13	8·7	
,, 26	41	45	,,	F.G.B.	13−1, 16+2	8·8	
,, 26	41	30	,,	Bd.	13−4, 18+1	9·1	
,, 27	42	60	,,	Gh.	13−3, =16, 18+3	9·0	
,, 28	43	t.30	,,	Bn.	7−5, 13+0·5	8·6	
,, 29	44	,,	,,	,,	7−5, 13+1	8·6	
Oct. 2	47	60	,,	Bd.	18−1, 27+4	9·4	
,, 3	48	30	,,	Gh.	=18, =20	9·3	
,, 4	49	60	,,	Bd.	18−2, 27+4	9·5	
,, 6	51	t.60	,,	Bn.	18−2, 27+4	9·5	
,, 6	51	T.94	,,	Ni.	13−2, 20+4	8·9	In t.22, 9·6. Yellowish orange.
,, 7	52	60	,,	Bd.	18−2, 27+4	9·5	
,, 7	52	30	,,	Gh.	18−1·5, =20, 24+1	9·4	
,, 11	56	60	2	Bd.	18−4, 27+2	9·7	
,, 14	59	45	1	Br.	13−3, 20+3	9·0	
,, 14	59	T.94	,,	Ni.	20−4·5, 34+3	9·8	In t.22, 10·2
,, 20	65	45	2	F.G.B.	20−3, 27+1·5	9·7	
,, 21	66	60	1	Bd.	=34	10·1	
,, 22	67	T.94	,,	Ni.	20−5, 34+1·5	9·9	
,, 25	70	60	,,	Bd.	=34	10·1	
,, 28	73	,,	,,	F.G.B.	27−2, 51+4	10·1	
,, 28	73	,,	,,	Gh.	27−4, =51, 56+6	10·4	
,, 30	8975	160	,,	Br.	27−3, 51+3	10·2	

(7120) χ CYGNI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Nov. 1	8977	60	1	F.G.B.	27−3, 51+3	10·2	
,, 5	81	T.94	,,	Ni.	=34	10·1	
,, 7	83	60	,,	F.G.B.	=58	10·9	
,, 7	83	,,	,,	Gh.	=58, =62	11·0	
,, 9	85	160	,,	Br.	51−2, 58+2	10·7	
,, 19	95	T.94	2	Ni.	62−2, 67+1	11·2	
,, 20	96	T.120	1	Bn.	59−4, 67+1·5	11·2	
,, 20	8996	160	,,	Br.	56−3, 67+2	11·2	
,, 29	9005	,,	,,	,,	67−3, 87+2	11·7	
Dec. 6	12	198	,,	F.G.B.	=87	11·9	
,, 6	12	60	2	Gh.	=74, =75	11·6	
,, 7	13	T.94	1	Ni.	67−4, 87+2	11·7	
,, 9	15	160	,,	Br.	87+1	11·8	
,, 18	24	T.94	,,	Ni.	87−2, 92+0·5	12·1	
,, 22	28	T.120	,,	Bn.	62−4, 75+1	11·4	
,, 24	30	198	2	F.G.B.	=97	12·2	Difficult.
,, 27	33	T.94	1	Ni.	92−4, 107+2·5	12·6	
,, 30	36	240	,,	Br.	104−1, 107+1	12·7	
1911.							
Jan. 28	65	,,	,,	,,	<104	<12·7	Not seen.
Feb. 19	87	T.94	2	Ni.	107−4	13·2	Doubtful.
,, 25	9093	,,	1	,,	107−4	13·2	
Mar. 19	9115	,,	,,	,,	87−2, 92+0·5	12·1	
,, 29	25	,,	,,	,,	=67	11·3	
Apr. 3	30	,,	,,	,,	62−2, 67+1·5	11·2	
,, 3	30	160	,,	Br.	62−2, 67+2	11·2	
,, 13	40	T.94	,,	Ni.	34−3, 51+2	10·4	
,, 18	45	160	,,	Br.	27−2, 51+4	10·1	
,, 19	46	45	,,	F.G.B.	=27	9·9	
,, 21	48	T.94	,,	Ni.	20−6·5, 34+1	10·0	
,, 28	55	66	,,	F.G.B.	20−1·5, 27+3	9·6	
,, 30	57	45	,,	Br.	18−1, 20−1	9·4	
,, 30	57	T.94	,,	Ni.	=13	8·7	In t.22, 9·7.
May 7	64	t.22	,,	,,	7−5, 13+0·5	8·6	
,, 15	72	,,	,,	,,	7−4, 13+2	8·5	
,, 15	72	45	,,	Br.	6−3, 7+3	7·8	
,, 21	78	t.22	,,	Ni.	7−3, 13+3	8·4	
,, 22	79	45	,,	F.G.B.	6−4, 7+2	7·9	
,, 27	84	T.50	,,	Bn.	6−3, 7+3	7·8	
,, 28	85	45	,,	Br.	6−2, 7+4	7·7	
,, 29	86	t.60	,,	Bn.	6−2, 7+3	7·8	
,, 29	86	t.22	,,	Ni.	6−4, 7+1	8·0	
June 1	89	t.30	,,	Bn.	6−1, 7+4	7·7	
,, 3	91	45	,,	F.G.B.	=6	7·5	
,, 4	92	30	,,	Gh.	6−6, =7, 13+6	8·1	
,, 4	92	t.22	2	Ni.	6−2, 7+3	7·8	
,, 6	9194	t.30	1	Bn.	6−1, 7+4	7·7	
,, 15	9203	t.22	,,	Ni.	6−1, 7+4	7·7	

(7120) χ CYGNI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
June 18	9206	45	1	Br.	=6	7·5	
,, 18	06	30	,,	Gh.	3−9, 6+2	7·3	
,, 24	12	45	,,	F.G.B.	=5	7·4	
,, 27	15	t.30	,,	Bn.	n−1, 6+4	7·1	
,, 28	16	30	,,	Gh.	3−9, =5, 6+2	7·3	
July 2	20	t.22	,,	Ni.	3−5, 0+5	6·9	
,, 4	22	45	2	F.G.B.	=4	6·8	
,, 10	28	B.	1	Bn.	2−1, 3+2	6·2	
,, 10	28	,,	,,	F.G.B.	=2	6·1	
,, 10	28	,,	2	Ma.	=g	5·6	
,, 11	29	t.22	1	Ni.	1−3, g+1	5·4	In B. 6·1. Yellow.
,, 12	30	30	,,	Gh.	=2	6·1	
,, 13	31	B.	2	Ma.	g−1	5·7	
,, 18	36	F.	1	Gh.	1−5, =g, 2+5	5·6	
,, 18	36	B.	,,	Ni.	1−4, g+1·5	5·4	
,, 20	38	90	2	Bh.	=1	5·1	
,, 20	38	B.	1	Br.	1−2, g+3	5·3	
,, 21	39	,,	,,	,,	1−1	5·2	
,, 21	39	,,	,,	Bn.	1−3, g+1	5·4	
,, 21	39	,,	,,	F.G.B.	1−1	5·2	
,, 22	40	,,	2	Ma.	1−1	5·2	
,, 22	40	,,	1	Ni.	1−4, g+1·5	5·4	
,, 23	41	,,	,,	Br.	=1	5·1	
,, 25	43	,,	2	Ma.	1−0·5	5·1	
,, 26	44	,,	1	Br.	=1	5·1	
,, 26	44	F.	2	Gh.	=1	5·1	
,, 26	44	B.	1	Ni.	1−3, g+2	5·4	
,, 27	45	,,	,,	Bn.	1−1·5, g+4	5·2	
,, 30	48	,,	,,	Br.	R−1, 1+2	4·9	
,, 31	49	,,	,,	Bn.	R−2, 1+1·5	4·9	
,, 31	49	,,	,,	Ma.	1+1·5	4·9	
Aug. 1	50	,,	,,	Br.	R−1, 1+2	4·9	
,, 3	52	,,	,,	,,	=R	4·7	
,, 3	52	,,	2	Ma.	1−1	5·2	
,, 3	52	,,	1	Ni.	S−1, 1+0·5	5·0	
,, 6	55	,,	,,	Gh.	c−8, 1+2	4·9	
,, 6	55	,,	,,	F.G.B.	c−8, 1+1·5	4·9	
,, 6	55	,,	,,	Ni.	S−0·5, 1+1	5·0	
,, 7	56	,,	,,	,,	=S, 1+1·5	4·9	
,, 7	56	,,	,,	Br.	R−1, 1+2	4·9	
,, 7	56	,,	,,	Gh.	c−7, 1+3	4·8	
,, 9	58	,,	,,	,,	c−6, 1+4	4·7	
,, 9	58	,,	2	Ma.	1+3	4·8	Reddish.
,, 11	60	,,	1	Gh.	c−8, 1+2	4·9	
,, 11	60	,,	,,	Ni.	S−1, 1+1	5·0	
,, 12	61	,,	,,	Gh.	c−6, 1+4	4·7	
,, 13	62	,,	,,	R.B.	R−1, 1+3	4·8	
,, 13	62	,,	,,	Ni.	S−1, 1+1	5·0	
,, 14	63	,,	,,	Bd.	c−6, R+2	4·6	
,, 15	64	,,	,,	,,	c−5, R+2·5	4·5	
,, 15	64	,,	,,	R.B.	=R	4·7	
,, 15	64	,,	,,	F.G.B.	e−1, 1+2	4·8	
,, 16	65	,,	,,	Br.	R−1, 1+2	4·9	
,, 17	9266	,,	,,	Ni.	S−1, 1+1	5·0	

(7120) χ CYGNI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
Aug. 21	9270	B	I	Bd.	=R	4·7	
,, 23	72	,,	,,	Ni.	S−I, I+0·5	5·0	
,, 24	73	,,	,,	Bd.	R−2, I+2	4·9	
,, 24	73	,,	,,	Br.	R−2, I+I	5·0	
,, 24	73	,,	,,	R.B.	R−I, I+2	4·9	
,, 24	73	,,	,,	Gh.	c−7, I+3	4·8	
,, 24	73	,,	,,	F.G.B.	e−0·5, I+3	4·7	
,, 25	74	,,	,,	Gh.	c−8, I+2	4·9	
,, 27	76	,,	,,	Ni.	S−I, I+0·5	5·0	
,, 28	77	N.E.	2	Br.	=I	5·I	
,, 28	77	B.	I	Gh.	c−8, I+2	4·9	
,, 30	79	,,	,,	R.B.	R−3, I+I	5·0	
,, 30	79	,,	,,	Ni.	=S, I+I	4·9	
,, 31	80	N.E.	,,	Br.	R−I, I+I	4·9	
,, 31	80	B.	,,	F.G.B.	e−3, I+I·5	4·9	
Sept. I	81	,,	2	Bd.	R−2, I+I	5·0	
,, I	81	F.	I	Br.	=I	5·I	
,, I	81	B.	,,	Gh.	=I	5·I	
,, 3	83	,,	,,	R.B.	R−3, I+0·5	5·0	
,, 6	86	,,	,,	F.G.B.	=I	5·I	
,, 7	87	,,	,,	Br.	I−I, g+4	5·2	
,, 7	87	,,	,,	Gh.	=I	5·I	
,, 9	89	,,	,,	Br.	=I	5·I	
,, IO	90	,,	,,	R.B.	I−2, g+2	5·3	
,, IO	90	90	2	Bh.	=I	5·I	
,, II	91	B.	I	Bd.	I−2, g+2	5·3	
,, II	91	,,	,,	Gh.	I−I, g+4	5·2	
,, I3	93	,,	,,	Bd.	I−2, g+2	5·3	
,, I4	94	,,	,,	Br.	I−2, g+3	5·3	
,, I5	95	,,	,,	Gh.	I−2, g+3	5·3	
,, I7	97	,,	,,	Br.	I−3, g+2	5·4	
,, I9	9299	,,	,,	Bd.	I−2, g+2	5·3	
,, 20	9300	90	2	Bh.	=g	5·6	
,, 20	00	B.	,,	Ma.	g−I	5·7	
,, 2I	0I	,,	I	Br.	I−3, g+2	5·4	
,, 2I	0I	,,	,,	Ni.	I−4, g+0·5	5·5	
,, 22	02	,,	,,	Bd.	I−3, g+I	5·4	
,, 22	02	,,	,,	Gh.	I−5, 2+5	5·6	
,, 24	04	,,	,,	Br.	I−3, g+2	5·4	
,, 24	04	,,	,,	R.B.	g−I, h+I	5·6	
,, 24	04	,,	,,	Gh.	=g	5·6	
,, 24	04	,,	2	Ma.	=g	5·6	About.
,, 24	04	,,	I	Ni.	I−4, g+0·5	5·5	
,, 26	06	,,	,,	Br.	=g	5·6	
,, 26	06	,,	,,	R.B.	I−3, g+I·5	5·4	
,, 26	06	,,	,,	Ni.	I−4, g+0·5	5·5	Orange.
,, 28	08	,,	,,	R.B.	g−0·5, h+I	5·6	
Oct. I	II	,,	,,	Bn.	I−3, g+I	5·4	
,, I	II	45	,,	F.G.B.	I−3, 2+6·5	5·4	
,, I	II	B.	,,	Gh.	I−8, 2+2	5·9	
,, I	II	,,	,,	Ni.	g−I·5, 3+7	5·7	Yellowish orange.
,, 4	I4	,,	2	Bd.	g−4, 2+2	5·9	
,, 9	I9	,,	,,	,,	2−I, 3+2·5	6·2	
,, 9	93I9	,,	I	Ni.	3+0·5	6·4	

(7120) χ CYGNI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
Oct. 10	9320	B.	1	Br.	2 2, 3+1	6·3	
,, 10	20	,,	2	Gh.	=2	6·1	
,, 10	20	t.22	1	Ni.	g−4, 3+4	6·0	Reddish orange.
,, 13	23	B.	,,	Bd.	3−1, n+4	6·5	
,, 16	26	,,	,,	,,	3−1·5, n+3	6·6	
,, 16	26	57	2	Bh.	=2	6·1	Very red.
,, 17	27	30	,,	Gh.	=3	6·4	
,, 17	27	t.22	1	Ni	g−6·5, 3+2	6·2	In B. 6·8. Yellowish orange.
,, 19	29	B.	,,	Bd.	=n	6·9	
,, 21	31	45	,,	Br.	3−1	6·5	
,, 21	31	,,	,,	F.G.B.	=3	6·4	
,, 22	32	B.	,,	R.B.	3−0·5, m+1	6·5	
,, 24	34	,,	,,	Bd.	=n	6·9	
,, 25	35	,,	,,	R.B.	m−2, n+1	6·8	
,, 25	35	30	,,	Gh.	3−7, 6+5	7·1	
,, 26	36	B.	,,	Bn.	3−4, n+1·5	6·8	
,, 28	38	,,	,,	,,	n−2, 6+4	7·1	
,, 28	38	30	,,	Bd.	n−3, 6+3	7·2	
,, 29	39	t.22	,,	Ni.	o−1, 6+0·5	7·5	
,, 30	40	B.	,,	Bn.	n−2, 6+4	7·1	
,, 30	40	57	,,	Bh.	=6	7·5	Very red.
,, 31	41	30	2	Bd.	n−3, 6+3	7·2	
,, 31	41	45	1	F.G.B.	3−1·5, 5+8	6·6	
Nov. 2	43	57	2	Bh.	6 3, 7+3	7·8	Dull red.
,, 5	46	t.22	1	Ni.	=6	7·5	
,, 6	47	45	,,	Br.	3−7, 6+4	7·1	
,, 6	47	,,	,,	F.G.B.	5−0·5, 6+1	7·4	
,, 12	53	B.	,,	Bn.	7−2, 13+4	8·3	
,, 12	53	30	,,	Gh.	9−3, =13, 16+3	8·7	
,, 17	58	90	,,	Bh.	=6	7·5	
,, 18	59	45	,,	F.G.B.	=7	8·1	
,, 20	61	60	,,	Br.	6−1, 7+4	7·7	
,, 21	62	T.50	,,	Bn	7−2, 13+4	8·3	
,, 21	62	t.22	,,	Ni	7−5, 13+1	8·6	
,, 22	63	57	,,	Bh.	=7	8·1	
,, 29	70	,,	2	,,	7 3, =9, 13+3	8·4	
,, 29	70	t.75	1	Bn.	20−1	9·5	
Dec. 3	74	45	,,	Br.	=13	8·7	
,, 4	75	,,	,,	F.G.B.	20−1, 27+4	9·5	
,, 4	75	57	2	Bh.	=12, =13	8·7	
,, 8	79	T.94	1	Ni.	=13	8·7	In t.22, 10·0.
,, 9	80	57	2	Bh.	16−1, 18+1	9·1	
,, 9	80	60	1	Gh.	=24, =29	9·6	
,, 11	82	45	,,	F.G.B.	20−2, 27+2	9·6	
,, 12	83	57	2	Bh.	=27, =28	9·8	
,, 15	86	45	1	Br.	20−5, 34+2	9·9	Doubtful.
,, 15	86	T.50	,,	Bn.	20−4, 27+1	9·8	
,, 17	88	T.94	2	Ni.	34−2, 51+2	10·3	Uncertain.
,, 18	89	90	,,	Bh.	51−2, 56+2, =59	10·7	
,, 20	91	T.95	1	Bn.	34−2, 51+2	10·3	
,, 24	95	66	2	F.G.B.	=51	10·5	
,, 24	9395	T.94	1	Ni.	34−3·5, 51+1	10·4	
,, 31	9402	57	2	Bh.	=59	10·8	

(7120) χ CYGNI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Jan. 5	9407	132	2	F.G.B.	=57	10·9	
„ 7	09	160	„	Br.	51−4, 67+4	10·9	
„ 7	09	150	„	Bh.	59−3, =62, =64, 67+3	11·1	
„ 7	09	T.94	1	Ni.	62−1, 67+2	11·1	
„ 11	13	150	2	Bh.	63−1, =64, 67+1	11·2	
„ 14	16	T.94	1	Ni.	62−2, 67+1	11·2	
„ 20	22	90	2	Bh.	63−3, 64−1, 67+1, 75+3	11·2	
„ 27	29	T.94	„	Ni.	=67	11·3	
Feb. 9	42	„	1	„	87−2, 92+1	12·1	
„ 11	44	„	„	„	87−2, 92+1	12·1	
„ 21	54	„	„	„	92−1·5, 107+5	12·3	
Mar. 19	81	„	„	„	107−2	13·0	
„ 20	82	160	2	Br.	107−4	13·2	About, glimpsed.
„ 22	9484	T.94	1	Ni.	107−3	13·1	
Apr. 8	9501	„	„	„	107−1	12·9	
„ 16	09	240	2	Br.	107−3	13·1	Glimpsed.
„ 19	12	T.94	1	Ni.	=107	12·8	
„ 21	14	„	„	„	107−2	13·0	
May 10	33	„	„	„	92−3, 107+3	12·5	
„ 16	39	„	„	„	87−1, 92+1	12·1	
„ 16	39	160	„	Br.	87−2, 97+1	12·1	
„ 16	39	132	„	F.G.B.	=75	11·5	
„ 20	43	T.94	„	Ni.	=87	11·9	
„ 23	46	60	„	Th.	62−5, 74+1·5	11·5	
„ 25	48	T.94	„	Ni.	62−2·5, 67+1	11·2	
„ 28	51	90	2	Bh.	=58, =62	11·0	
„ 31	54	„	„	„	=58, =59	10·8	
June 2	56	60	1	Gh.	=63, =64	11·1	
„ 5	59	T.94	„	Ni.	62−0·5, 67+3	11·0	
„ 6	60	160	„	Br.	51−2, 56+2	10·7	
„ 6	60	132	„	F.G.B.	62−1, 75+4·5	11·1	
„ 6	60	90	„	Bh.	=54, =59	10·8	
„ 9	63	„	„	„	=50, 51−3, 56+3	10·7	
„ 10	64	60	„	Gh.	58−1, =62, 64+1	11·0	
„ 14	68	45	2	Bh.	=47, =51	10·6	
„ 18	72	T.94	1	Ni.	=34	10·1	
„ 19	73	45	2	Bh.	41−1, 47+1	10·5	
„ 20	74	„	1	F.G.B.	51−3, 58+0·5	10·8	
„ 21	75	60	„	Gh.	=62	11·0	
„ 23	77	160	„	Br.	=51	10·5	
„ 29	83	45	„	Bh.	34−4, =41, 56+4	10·5	
July 4	88	„	2	„	27−3, 34−2, 47+3, 51+2	10·3	
„ 5	89	„	„	„	20−3, 27+1, 29+1, 34+3	9·7	
„ 5	89	T.94	„	Ni.	34−1, 51+3	10·2	In t.22, 10·4.
„ 8	92	T.120	1	Bn.	34−1	10·2	
„ 8	9592	45	„	Bh.	=26, =29	9·7	Red.

(7120) χ CYGNI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
July 10	9594	T.94	2	Ni.	20−4·5, 34+3	9·8	
,, 11	95	45	1	Bh.	=27, 29−2, =30, 34+2	9·9	
,, 15	99	,,	,,	,,	=29	9·7	
,, 15	99	160	,,	Br.	27−5, 51+2	10·4	
,, 15	9599	T.95	,,	Bn.	27−0·5, 34+1	10·0	
,, 23	9607	T.94	2	Ni.	34−1·5, 51+3	10·2	
,, 25	09	45	,,	Bh.	26−1, 27+1, =29	9·8	
,, 27	11	,,	,,	,,	=21, =24, =26	9·6	
,, 27	11	T.94	1	Ni.	34−1·5, 51+3	10·2	
,, 30	14	45	2	Bh.	=24, =26	9·6	
Aug. 1	16	T.94	1	Ni.	=34	10·1	
,, 2	17	45	,,	Bh.	20−3, =26, =27, 34+3	9·8	
,, 5	20	60	,,	Th.	34+1	10·0	Red.
,, 5	20	45	,,	Bh.	20−2, =26, 27+2	9·6	
,, 9	24	T.94	,,	Ni.	20−1, 34+6	9·5	In t.22, 10·0.
,, 11	26	45	,,	Bh.	19−1, =20, 24+1	9·4	
,, 13	28	T.94	,,	Ni.	20+2·5	9·1	In t.22, 9·9.
,, 18	33	t.22	,,	,,	7−4, 13+1·5	8·5	
,, 19	34	,,	,,	,,	7−3, 13+3	8·4	Orange yellow.
,, 19	34	45	2	Bh.	6−6, 7−1, 8+1, 13+6	8·2	
,, 20	35	t.22	1	Ni.	=7	8·1	
,, 20	35	60	,,	Th.	6−1	7·6	Red.
,, 22	37	,,	,,	,,	6−1	7·6	
,, 26	41	45	2	Bh.	3−6, =5, 6+6	7·1	
,, 27	42	t.22	1	Ni.	3−4, 0+6	6·8	
,, 27	42	60	2	Th.	=3	6·4	
,, 29	44	B.	,,	Br.	2−1, 3+2	6·2	
,, 29	44	45	,,	Bh.	=3	6·4	
,, 29	44	t.22	,,	Ni.	3−1	6·5	Orange yellow.
,, 30	45	60	,,	Th.	2+1	6·0	
,, 30	45	45	,,	Bh.	=2	6·1	
Sept. 1	47	B.	,,	Bn.	g−4, 2+1	6·0	
,, 1	47	60	1	Th.	g−4, 2+1	6·0	
,, 2	48	B.	,,	Br.	=2	6·1	
,, 2	48	,,	,,	Ma.	1−7, 2+3·5	5·7	
,, 4	50	,,	,,	Br.	g−2, 2+3	5·8	
,, 4	50	,,	,,	Ma.	1−3·5, 2+7	5·4	
,, 4	50	,,	,,	Ni.	g+1·5	5·4	
,, 4	50	,,	,,	Th.	g−1, 2+4	5·7	
,, 5	51	45	,,	Bh.	1−4·5, 3+9	5·5	
,, 5	51	B.	,,	Ni.	1−4, g+0·5	5·5	
,, 6	52	,,	,,	Th.	1−3·5, g+1	5·4	
,, 10	56	45	2	Bh.	1−7, 2+3·5	5·7	
,, 10	56	30	,,	Tn.	1−4, g+1	5·5	
,, 11	57	B.	,,	Ni.	1−3·5, g+1	5·4	
,, 12	58	,,	1	,,	1−2, g+2	5·3	
,, 12	58	,,	2	Ma.	1−4, h+2	5·5	
,, 12	58	,,	,,	Th.	1−1, g+3·5	5·2	
,, 13	59	,,	1	Br.	=1	5·1	
,, 13	59	,,	,,	Th.	1−1, g+3·5	5·2	
,, 14	60	F.	,,	Tn.	1−1, g+4	5·2	
,, 14	9660	B.	,,	Ni.	1−2·5, g+2	5·3	

(7120) χ CYGNI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Sept. 15	9661	B.	2	Ma.	1−3, h+3	5·4	
,, 16	62	F.	,,	Tn.	1−1, g+4	5·2	
,, 16	62	B.	1	Ni.	1−1, g+4	5·2	
,, 16	62	,,	,,	Th.	=1	5·1	
,, 17	63	,,	,,	Br.	R−2, 1+1	5·0	
,, 17	63	,,	,,	Bn.	1−1, g+3	5·2	
,, 18	64	,,	2	Th.	1−0·5	5·1	Very red.
,, 19	65	,,	1	Ni.	1−1, g+4	5·2	
,, 20	66	,,	,,	Br.	1+1	5·0	
,, 20	66	,,	,,	Bn.	R−2, 1+1	5·0	
,, 20	66	,,	,,	Ma.	=1	5·1	
,, 20	66	,,	2	Th.	1−1, g+4	5·2	Ruddy.
,, 21	67	,,	,,	,,	=1	5·1	
,, 21	67	45	,,	Bh.	=1	5·1	In B. 5·1
,, 21	67	B	1	Ma.	1−1	5·2	
,, 21	67	F.	2	Tn.	1−1·5, g+3	5·2	
,, 21	67	B.	1	Ni.	1+1·5	4·9	
,, 22	68	,,	,,	Br.	R−2, 1+1	5·0	
,, 22	68	45	2	Bh.	=1	5·1	
,, 22	68	B.	1	Ma.	1−1·5	5·2	
,, 22	68	,,	,,	Th.	1−0·5, g+4	5·1	
,, 23	69	,,	,,	Bn.	R−3, 1+0·5	5·0	
,, 23	69	,,	,,	Ni.	S−1, =1	5·0	
,, 24	70	F.	2	Tn.	1−1, g+4	5·2	
,, 24	70	B.	1	Ni.	=1	5·1	
,, 26	72	,,	,,	,,	S−1, =1	5·0	
,, 26	72	,,	2	Th.	1−1, g+4	5·2	
,, 27	73	20	,,	La.	1+5	4·6	In B. 4·8. Doubtful. [C.L.B.]
,, 27	73	F.	,,	Tn.	1−1, g+4	5·2	
,, 27	73	B.	1	Th.	1−0·5	5·1	Red.
Oct. 1	77	F.	,,	Tn.	1−1·5, g+3	5·2	
,, 2	78	B.	,,	R.B.	R−3, 1+0·5	5·0	
,, 2	78	,,	,,	Bn.	1−1, g+4	5·2	
,, 2	78	45	,,	Bh.	=1	5·1	In B. 5·1
,, 2	78	B.	,,	Ni.	=1	5·1	
,, 2	78	,,	,,	Th.	1−0·5, g+4	5·1	
,, 3	79	,,	,,	Ma.	1−1	5·2	
,, 4	80	,,	,,	Ni.	=1	5·1	
,, 4	80	,,	,,	Th.	1−0·5, g+4	5·1	
,, 5	81	,,	,,	Bn.	=1, g+4	5·1	
,, 5	81	,,	,,	Ma.	1−1	5·2	
,, 6	82	,,	,,	Ni.	1+1	5·0	
,, 6	82	,,	,,	Th.	1−1, g+4	5·2	
,, 7	83	,,	,,	Bn.	1−1	5·2	
,, 7	83	45	,,	Bh.	R−2, 1+2	4·9	
,, 7	83	B.	,,	Ma.	1−1·5	5·2	
,, 8	84	F.	,,	Tn.	1−1·5, g+3	5·2	
,, 8	84	B.	,,	Ni.	=1	5·1	
,, 9	85	,,	,,	Ma.	1−2	5·3	
,, 9	85	,,	,,	Th.	1−1, g+3	5·2	
,, 10	86	,,	,,	Br.	=1	5·1	
,, 10	86	,,	,,	Bn.	1−1, g+4	5·2	
,, 10	86	F.	,,	Tn.	1−2, g+3	5·3	
,, 11	9687	45	,,	Bh.	1+2	4·9	In F. 4·7.

(7120) χ CYGNI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Oct. 11	9687	20	1	La.	1+1	5·0	
,, 11	87	B.	,,	Ma.	1−2	5·3	
,, 12	88	,,	,,	Ni.	1−1, g+4	5·2	
,, 13	89	20	,,	La.	1+2	4·9	
,, 14	90	B.	,,	Bn.	1−1, g+3	5·2	
,, 14	90	20	,,	La.	=1	5·1	
,, 14	90	B.	,,	Th.	1−2, g+2	5·3	
,, 16	92	F.	,,	Tn.	1−2, g+2	5·3	
,, 17	93	B.	,,	Br.	1−2, g+3	5·3	
,, 17	93	,,	,,	Bn.	1−1, g+3	5·2	
,, 17	93	45	,,	Bh.	=1	5·1	
,, 17	93	20	,,	La.	1−2	5·3	
,, 17	93	B.	,,	Ma.	1−3, h+3	5·4	
,, 17	93	,,	,,	Ni.	1−3·5, g+2	5·4	
,, 17	93	,,	,,	Th.	1−3·5, g+1	5·4	
,, 18	94	F.	,,	Tn.	1−3, g+1	5·4	
,, 19	95	B.	,,	Br.	1−4, g+1	5·5	
,, 19	95	20	,,	La.	1−1	5·2	
,, 19	95	B.	,,	Ni.	1−3·5, g+2	5·4	
,, 20	96	,,	,,	Th.	1−4, g+1	5·5	
,, 21	97	F.	2	Tn.	1−3, g+1	5·4	
,, 22	98	B.	,,	Br.	g−2, 2+3	5·8	
,, 22	98	45	,,	Bh.	1−2, 2+8	5·3	
,, 23	9699	20	1	La.	1−6, 2+4	5·7	
,, 25	9701	45	,,	Bh.	=1	5·1	
,, 26	02	20	,,	La.	1−7, 2+3	5·8	
,, 27	03	B.	,,	Ni.	g−2, 3+6	5·8	
,, 27	03	,,	,,	Th.	=2	6·1	
,, 28	04	,,	2	Tn.	g−1, 2+4	5·7	
,, 29	05	,,	1	Br.	g−4, 2+1	6·0	
,, 29	05	45	,,	Bh.	1−7, 2+3	5·8	
,, 30	06	20	,,	La.	1−7, 2+3	5·8	
,, 30	06	B.	2	Th.	=2	6·1	
,, 31	07	45	,,	Bh.	2+2	5·9	
Nov. 1	08	B.	1	Br.	2−1, 3+2	6·2	
,, 1	08	F.	,,	Tn.	g−4, 2+1	6·0	
,, 1	08	B.	,,	Th.	2−0·5, 3+2	6·2	
,, 2	09	45	2	Bh.	1−8, 2+2	5·9	
,, 2	09	B.	1	Ma.	g−4, 3+4	6·0	
,, 3	10	,,	,,	Bn.	2−1, 3+2	6·2	
,, 3	10	,,	,,	Ni.	3−1	6·5	
,, 4	11	20	,,	La.	2−1, 3+2·5	6·2	
,, 7	14	45	,,	Bh.	=2, 3+2	6·1	
,, 7	14	20	,,	La.	=2	6·1	Orange.
,, 7	14	B.	,,	Ma.	3−1	6·5	
,, 9	16	45	,,	Br.	3−3, 6+8	6·7	
,, 10	17	,,	,,	Bh.	=3	6·4	Bright red.
,, 11	18	,,	,,	,,	3−2	6·6	
,, 11	18	B.	,,	Th.	4−1·5, 5+5	6·9	
,, 12	19	20	2	La.	3−1, 4+3	6·5	
,, 12	19	B.	,,	Th.	4−3, 5+3	7·1	
,, 12	19	t.22	1	Ni.	3−3, 0+6	6·7	In B. 6·9. Orange yellow.
,, 13	20	t.30	2	Bn.	n+1	6·8	
,, 13	9720	20	1	La.	=4	6·8	

(7120) χ CYGNI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Nov. 15	9722	30	1	Tn.	3−3, 5+7	6·7	
,, 17	24	45	2	Bh.	3−6, 6+6	7·0	
,, 17	24	B.	1	Th.	4−3, 5+3	7·1	
,, 18	25	45	,,	Br.	3−6, 6+5	7·0	
,, 18	25	30	,,	Tn.	3−7, 5+3	7·1	
,, 20	27	20	,,	La.	4−5, 6+2·5	7·3	
,, 20	27	60	,,	Th.	=6	7·5	Very red.
,, 24	31	t.22	,,	Ni.	6−3, 7+2	7·9	
,, 24	31	45	2	Bh.	=6	7·5	Deep red.
,, 25	32	,,	1	,,	=6	7·5	
,, 25	32	20	,,	La.	4−6, 6+1·5	7·4	
,, 26	33	60	,,	Th.	=6	7·5	
,, 29	36	T.50	,,	Bn.	6−4, 7+1	8·0	
,, 30	37	45	,,	Br.	=6	7·5	
,, 30	37	30	,,	Tn.	3−8, 5+2	7·2	
,, 30	37	60	,,	Th.	6−3, 7+3	7·8	
Dec. 2	39	30	,,	Tn.	5−1, 6+1	7·5	
,, 3	40	20	,,	La.	6−4, 7+2	7·9	
,, 3	40	t.22	,,	Ni.	7−1, 13+4	8·2	
,, 5	42	20	2	La.	=9	8·4	
,, 6	43	45	1	Bh.	6−3, =7, 9+6	7·9	Orange red.
,, 6	43	20	,,	La.	9−1, 13+2	8·5	
,, 6	43	50	,,	Ma.	6−4, 7+2	7·9	Ruddy.
,, 8	45	45	,,	Bh.	6−4, =7, 9+4	8·0	
,, 8	45	20	,,	La.	9−2, 13+1	8·6	
,, 8	45	60	,,	Th.	9−0·5, 13+2	8·5	
,, 9	46	20	,,	La.	=13	8·7	
,, 12	49	T.50	,,	Bn.	7−4, 13+2	8·5	Very red.
,, 12	49	50	,,	Ma.	7−1·5	8·3	
,, 12	49	t.22	,,	Ni.	7−4·5, 13+1	8·6	
,, 16	53	45	,,	Br.	7−1, 9+1	8·3	
,, 16	53	,,	,,	Bh.	7−3, 12+3	8·4	Very red.
,, 16	53	50	,,	Ma.	7−1	8·2	
,, 16	53	120	,,	Th.	=12	8·8	
,, 18	55	,,	2	,,	=13	8·7	
,, 20	57	T.94	1	Ni.	7−4, 13+1	8·5	In t.22, 9·4.
,, 21	58	160	2	Bh.	7−1	8·2	
,, 23	60	45	,,	,,	7−3, =13, 12+3	8·5	
,, 28	65	160	1	Br.	9−3, =13	8·7	
,, 28	65	45	,,	Bh.	18−1, =20, 24+1	9·4	Very red.
,, 29	66	T.50	,,	Bn.	18−4, 27+2	9·7	
,, 29	66	50	,,	Ma.	20−1, 27+3	9·5	
,, 29	66	60	,,	Th.	18−1, 20−1, 21+1, 27+3	9·5	
,, 29	66	T.94	,,	Ni.	20−3, 34+3	9·7	
,, 31	68	45	2	Bh.	20−2, 27+2	9·6	
,, 31	68	60	1	Th.	=27	9·9	
1913.							
Jan. 2	70	90	,,	Bh.	24−3, =29, 32+3	9·8	
,, 5	73	45	,,	,,	20−2, =26, 27+2, =29	9·7	
,, 5	73	T.50	,,	Bn.	27−1·5, 34+1	10·0	
,, 5	9773	50	,,	Ma.	20−4, 27+1	9·8	

(7120) χ CYGNI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Jan. 5	9773	60	1	Th.	34−1, 36+0·5	10·2	
,, 6	74	40	2	La.	36−1	10·3	
,, 9	77	79	1	Ma.	34−1, 51+4	10·2	
,, 9	77	T.94	,,	Ni.	20−5, 34+1·5	9·9	
,, 11	79	45	2	Bh.	27−1, 34+1	10·0	
,, 12	80	T.95	1	Bn.	=34	10·1	
,, 12	80	79	,,	Ma.	27+0·5	9·8	
,, 16	84	T.94	,,	Ni.	34−2, 51+3	10·3	
,, 17	85	90	2	Bh.	26−4, =34, 41+4	10·0	
,, 25	93	120	,,	Br.	51−4, 67+4	10·9	
,, 26	94	T.120	1	Bn.	62−1·5, 75+4	11·1	
,, 26	94	90	2	Bh.	34−2, =47, 51+2	10·4	
,, 27	95	T.94	1	Ni.	34−4, 51+0·5	10·5	
,, 31	9799	90	,,	Bh.	=56, =58	10·9	
Feb. 8	9807	120	2	Br.	67−5	11·8	About.
,, 8	07	90	,,	Bh.	=63, =64	11·1	
,, 15	14	T.94	1	Ni.	67−2·5, 87+3	11·6	
,, 21	20	90	2	Bh.	=74, =75, =76	11·6	
,, 27	26	,,	1	,,	87−1, 97+1	12·1	
,, 27	26	230	,,	Th.	87−1, 92+1	12·1	
Mar. 1	28	T.94	,,	Ni.	92−5, 107+1·5	12·7	
,, 4	31	90	2	Bh.	87−4, =97, 107+4	12·3	
,, 11	38	,,	,,	,,	92−1, =97	12·2	
,, 11	38	120	,,	Th.	=97	12·2	Difficult.
,, 27	54	150	,,	Bh.	97−3, =104, 107+3	12·6	
Apr. 1	59	90	,,	,,	101−5, 107−1	12·9	
,, 5	63	150	,,	,,	104−3, =107	12·9	
,, 7	65	T.94	1	Ni.	107−4	13·2	
,, 17	75	150	,,	Bh.	<107	<12·8	Not seen.
,, 25	83	120	,,	Br.	κ−3	13·5	Very faint.
,, 25	83	T.94	2	Ni.	107−5	13·3	Difficult.
,, 27	85	,,	1	,,	107−5	13·3	
May 9	97	120	,,	Br.	=κ	13·2	About, glimpsed.
,, 11	9899	T.94	,,	Ni.	107−5	13·3	
,, 17	9905	150	2	Bh.	=κ, =λ	13·3	M.
,, 25	13	240	1	Br.	κ−5	13·7	About, difficult.
,, 25	13	150	,,	Bh.	=λ	13·4	M.
,, 25	13	T.94	,,	Ni.	107−5	13·3	
,, 27	15	150	,,	Bh.	=κ, =λ	13·3	M.
,, 31	19	120	,,	Br.	κ−2	13·4	
,, 31	19	150	2	Bh.	=110, =κ	13·1	M.
June 1	20	,,	,,	,,	=κ	13·2	M.
,, 1	20	210	,,	Th.	107−5	13·3	
,, 2	21	T.94	1	Ni.	107−5	13·3	
,, 4	23	240	,,	Br.	=λ	13·4	About.
,, 4	23	150	,,	Bh.	=κ, =λ	13·3	M.
,, 7	26	120	,,	Br.	κ−2, λ+2	13·3	
,, 8	27	117	,,	Bh.	=κ	13·2	M.
,, 10	29	183	,,	Ma.	=B	13·4	
,, 14	33	150	2	Bh.	107−1, κ+1	13·0	M.
,, 14	9933	T.94	1	Ni.	107−3	13·1	

(7120) χ CYGNI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
June 16	9935	150	2	Bh.	107−1, ϰ+1	13·0	M.
,, 23	42	183	1	Ma.	B+1	13·3	
,, 27	46	,,	,,	,,	97−6, B+6	12·8	
,, 28	47	,,	,,	,,	97−1·5	12·4	
,, 30	49	150	,,	Bh.	94−1, =98, 101+1	12·4	M.
July 8	57	,,	,,	,,	=92, =97	12·2	M.
,, 8	57	300	2	Th.	92 −1	12·3	
,, 8	57	T.94	1	Ni.	=92	12·2	
,, 11	60	79	,,	Ma.	87 1, =104	12·3	
,, 12	61	T.120	,,	Bn.	=92	12·2	
,, 12	61	T.94	,,	Ni.	87−1, 92+1·5	12·0	
,, 14	63	300	,,	Th.	87+1	11·8	
,, 16	65	210	,,	,,	=87	11·9	
,, 19	68	90	,,	Bh.	75−2, =81, 87+1	11·7	
,, 22	71	155	,,	Th.	64−2, =67	11·3	
,, 24	73	183	,,	Ma.	58−4, 87+6	11·3	
,, 25	74	150	2	Bh.	75−2, =74, 87+2	11·7	
,, 27	76	155	,,	Th.	67−2·5, 74+1	11·6	
,, 29	78	183	1	Ma.	62−5, 87+5	11·5	
,, 30	79	150	,,	Bh.	62−2, =64, 67+2	11·1	
,, 31	80	183	,,	Ma.	62−2, 87+7	11·2	
Aug. 1	81	160	,,	Br.	62−2, 67+1	11·2	
,, 1	81	90	,,	Bh.	58−1, =62, 63+1	11·0	
,, 1	81	183	,,	Ma.	62−1	11·1	
,, 2	82	155	,,	Th.	62−2, 75+2	11·3	
,, 3	83	183	,,	Ma.	62−2, 87+7·5	11·2	
,, 4	84	155	,,	Th.	=62	11·0	
,, 5	85	183	,,	Ma.	62−0·5	11·1	
,, 10	90	,,	,,	,,	62−0·5	11·1	
,, 12	92	T.94	,,	Ni.	62−1·5, 67+2	11·1	
,, 15	95	,,	,,	,,	=34	10·1	
,, 16	9996	90	,,	Bh.	51−5, =56, 75+5	11·0	
,, 21	0001	T.94	,,	Ni.	34−3, 51+2, 62+3	10·5	
,, 23	03	160	,,	Br.	=51	10·5	
,, 23	03	155	2	Th.	51+1·5	10·4	
,, 24	04	90	1	Bh.	49−1, =54, 56+1	10·8	
,, 26	06	T.94	,,	Ni.	34−2, 51+2 .	10·3	
Sept. 2	13	90	,,	Bh.	34−3, 29−5, 50+5, 51+1·5	10·3	
,, 5	16	,,	,,	,,	20−6, 51+6	10·0	
,, 6	17	183	2	Ma.	=27	9·9	
,, 6	17	120	1	Th.	27−1·5, 51+5	10·0	
,, 6	17	T.94	,,	Ni.	20−6, 34+1	10·0	
,, 7	18	160	,,	Br.	=27	9·9	
,, 7	18	T.95	,,	Bn.	34−1·5, 51+3	10·2	
,, 9	20	90	,,	Bh.	20−3, =27, 34+3	9·8	
,, 9	20	60	,,	Tn.	34−2, 51+2	10·3	Very red.
,, 11	22	T.94	,,	Ni.	20−3, 34+3	9·7	
,, 12	23	79	,,	Ma.	27−0·5, 34+2	9·9	Deep red.
,, 14	25	62	,,	Th.	20−1, 27+3	9·5	
,, 16	27	60	,,	Tn.	20−1, 27+4	9·5	Very red.
,, 17	28	T.50	,,	Bn.	18−1, 27+5	9·4	
,, 20	0031	90	,,	Bh.	16−2, 20+1	9·3	

(7120) χ CYGNI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Sept. 20	0031	79	1	Ma.	20+1·5	9·2	Red.
,, 21	32	45	,,	Br.	16−2, 20+2	9·2	
,, 21	32	30	,,	Tn.	=20	9·4	
,, 21	32	T.94	,,	Ni.	=13	8·7	In t.22, 9·6.
,, 23	34	40	,,	La.	13−3, =16	9·0	
,, 24	35	25	,,	Bo.	13−1, 16+3	8·7	
,, 24	35	37	,,	Th.	16−1, 18+1	9·1	
,, 26	37	20	,,	La.	13−2, 16+2	8·8	
,, 26	37	50	,,	Ma.	=7	8·1	
,, 27	38	25	,,	Bo.	7−1·5, 13+4	8·3	
,, 27	38	45	,,	Bh.	7−6, 20+6	8·8	
,, 27	38	37	2	Th.	9−1, 13+1	8·5	Red.
,, 27	38	T.94	1	Ni.	7−2·5, 13+3	8·4	In t.22, 8·6.
,, 28	39	T.50	,,	Bn.	7−4, 13+2	8·5	
,, 28	39	30	,,	Tn.	=13	8·7	
,, 28	39	50	,,	Ma.	=7	8·1	About.
,, 29	40	30	,,	Tn.	7−3, 13+3	8·4	
,, 30	41	25	2	Bo.	6−5, 7+0·5	8·0	
,, 30	41	50	1	Ma.	7+1	8·0	
Oct. 1	42	45	,,	Bh.	6−4, 7+2	7·9	
,, 2	43	30	,,	Tn.	6−4, 7+2	7·9	
,, 3	44	50	,,	Ma.	6−4, 7+1	8·0	
,, 4	45	25	,,	Bo.	6−2, 7+4	7·7	
,, 5	46	90	2	Bh.	6−2, 7+4	7·7	
,, 5	46	20	1	La.	0−2, 6+2	7·4	Orange.
,, 5	46	30	,,	Tn.	3−9, 6+2	7·3	
,, 6	47	,,	,,	,,	3−8, 6+3·5	7·2	
,, 6	47	37	2	Th.	5+1	7·3	
,, 9	50	30	1	Tn.	3−7, 6+4·5	7·1	
,, 9	50	20	,,	La.	3−2, =4	6·7	
,, 9	50	50	2	Ma.	6+3	7·2	Red.
,, 9	50	t.22	,,	Ni.	0−1, 6+1	7·4	
,, 12	53	25	,,	Bo.	3−1, 4+3	6·5	
,, 12	53	50	1	Ma.	6+4	7·1	Red.
,, 14	55	30	,,	Tn.	=3	6·4	Very red.
,, 14	55	F.	,,	Th.	3−3	6·7	
,, 16	57	B.	,,	,,	3−2	6·6	
,, 16	57	45	2	Bh.	2−5, =3, 6+10	6·5	
,, 17	58	,,	1	Br.	2+1	6·0	In B. 6·3.
,, 17	58	F.	,,	Tn.	2−2, 3+1	6·3	
,, 17	58	t.22	,,	Ni.	g−4, 3+5	5·9	In B. 6·2.
,, 18	59	F.	2	Th.	2−1	6·2	
,, 19	60	20	1	La.	1−4, g+2, h+4	5·4	
,, 20	61	B.	,,	Ni.	g−6, 3+2·5	6·2	
,, 22	63	F.	,,	Tn.	1−8, 2+2	5·9	
,, 23	64	B.	,,	Ma.	h+1	5·6	
,, 24	65	,,	2	Bo.	1−2, 2+8	5·3	
,, 24	65	,,	1	Br.	2+1	6·0	
,, 24	65	45	,,	Bh.	2+1	6·0	In B. 6·0.
,, 25	66	B.	2	Bo.	1−2, g+2	5·3	
,, 25	66	20	1	La.	1−1, g+3	5·2	Yellow.
,, 25	66	F.	,,	Tn.	1−7, 2+3	5·8	
,, 25	66	,,	2	Th.	1−7, 2+2	5·8	
,, 25	66	B.	1	Ma.	g−1·5, 2+4	5·7	
,, 25	0066	,,	,,	Ni.	g−2, 3+6·5	5·8	

(7120) χ CYGNI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Oct. 28	0069	F.	1	Tn.	1−5, 2+5	5·6	
„ 28	69	B.	„	Ni.	1−4, g+1	5·5	
„ 29	70	„	„	Br.	=g	5·6	
„ 29	70	„	„	Bh.	1−7, 2+2	5·8	
„ 29	70	F.	„	Th.	1−3, g+1	5·4	
„ 30	71	„	„	Tn.	1−5, 2+5	5·6	
„ 31	72	B.	„	Bh.	1−3, 2+6	5·4	
„ 31	72	20	„	La.	e−3, 1+2	4·9	Orange. In B. 5·3.
„ 31	72	F.	„	Tn.	=g	5·6	
„ 31	72	B.	„	Th.	1−2, g+2	5·3	
Nov. 1	73	„	„	Bo.	c−9, 1+1	5·0	
„ 1	73	„	„	Br.	1−3, g+2	5·4	
„ 1	73	„	„	Ma.	1−3, g+1·5	5·4	
„ 3	75	„	„	Bk.	1−4	5·5	
„ 3	75	45	„	Bh.	=1	5·1	Orange red.
„ 3	75	F.	„	Tn.	1−2, g+3	5·3	
„ 3	75	B.	„	Th.	1−1, g+3	5·2	
„ 3	75	„	„	Ni.	1−2, g+2	5·3	
„ 5	77	„	„	Bn.	1−1, g+4	5·2	
„ 5	77	F.	„	Th.	1−1·5	5·2	
„ 5	77	B.	„	Ma.	1−3, g+2	5·4	
„ 6	78	F.	„	Tn.	1−1, g+4	5·2	
„ 7	79	B.	2	Bo.	=1	5·1	
„ 7	79	F.	1	Bh.	=1	5·1	Very orange.
„ 7	79	B.	„	Ma.	1−2, g+3	5·3	
„ 7	79	„	„	Ni.	1−1, g+3	5·2	
„ 9	81	F.	2	Tn.	1−1, g+4	5·2	
„ 10	82	B.	1	Br.	1−1	5·2	
„ 11	83	„	„	Ni.	1−1·5, g+4	5·2	
„ 12	84	F.	„	Bh.	1+2	4·9	In B. 4·9.
„ 12	84	B.	2	Th.	1−1, g+4	5·2	
„ 13	85	„	1	Br.	1−1	5·2	
„ 13	85	F.	2	Tn.	1−1, g+4	5·2	
„ 14	86	B.	„	Bo.	c−8, 1+2	4·9	
„ 15	87	20	1	La.	e−2, 1+3	4·8	
„ 17	89	90	„	Bk.	1−1·5	5·2	
„ 17	89	B.	„	Bh.	1+2	4·9	
„ 17	89	F.	„	Th.	1−1·5	5·2	
„ 18	90	B.	„	Bo.	c−9, 1+1	5·0	
„ 18	90	„	„	Bn.	1−3, g+1	5·4	
„ 18	90	20	„	La.	=1	5·1	Yellow. In B. 5·1.
„ 18	90	B.	„	Ma.	1−2, g+3·5	5·2	Pale orange red.
„ 19	91	„	„	Ni.	1−2, g+3	5·3	
„ 21	93	F.	2	Tn.	1−1, g+4	5·2	
„ 22	94	B.	1	Br.	1−4, g+1	5·5	
„ 22	94	„	„	Bn.	1−3·5, g+1	5·4	
„ 22	94	F.	2	Th.	1−2, g+2	5·3	
„ 22	94	B.	1	Ma.	1−3, g+1	5·4	
„ 22	94	„	„	Ni.	1−3, g+1·5	5·4	
„ 24	96	F.	„	Bh.	=1	5·1	
„ 24	96	„	„	Tn.	=g	5·6	
„ 25	97	B.	„	Ni.	1−4, g+1	5·5	
„ 26	98	20	„	La.	1−1, g+4	5·2	
„ 26	0098	F.	„	Tn.	g−1, 2+4	5·7	

(7120) χ CYGNI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Nov. 28	0100	B.	1	Bn.	1−4, g+1	5·5	
„ 28	00	„	„	Ma.	g−1	5·7	
„ 29	01	„	„	Th.	g+1	5·5	
„ 30	02	20	„	La.	1−1, g+3	5·2	
Dec. 1	03	F.	„	Bh.	1−1	5·2	
„ 4	06	„	„	„	1−2	5·3	
„ 4	06	„	2	Tn.	1−7, 2+3	5·8	
„ 5	07	„	„	Th.	g+1·5	5·4	
„ 6	08	„	„	Tn.	1−8, 2+2	5·9	
„ 7	09	t.22	„	Ni.	3+2	6·2	
„ 8	10	B.	„	Bo.	1−8, 2+2	5·9	
„ 8	10	20	1	La.	1−3, g+1, h+4	5·4	
„ 9	11	45	„	Bh.	1−2	5·3	
„ 9	11	B.	2	Th.	=g	5·6	
„ 10	12	F.	1	„	2+1	6·0	
„ 11	13	20	2	La.	=g, h+2	5·5	
„ 12	14	F.	„	Tn.	2−0·5, 3+2	6·2	In T.30, 6·1.
„ 14	16	B.	1	Bn.	2−2·5, 3+1	6·3	
„ 15	17	20	„	La.	g−2, =h, =2	5·9	
„ 16	18	B.	„	Br.	2−2, 3+1	6·3	
„ 16	18	F.	„	Tn.	2−2, 3+1	6·3	
„ 17	19	B.	„	Bo.	2−2·5, 3+1	6·3	
„ 18	20	„	„	Bn.	3−1	6·5	
„ 18	20	30	„	Tn.	2−3, =3	6·4	
„ 18	20	t.22	„	Ni.	g−6, 3+3	6·1	In B. 6·5.
„ 20	22	50	„	Ma.	6+4, 7+6	7·3	
„ 21	23	45	„	Bh.	2+1, 3+3	6·0	
„ 21	23	20	„	La.	h−1, =2, 3+4	6·0	
„ 21	23	F.	2	Th.	3−2	6·6	
„ 24	26	45	1	Br.	3−3, 6+8	6·7	
„ 24	26	30	„	Tn.	3−3·5, 6+8	6·7	
„ 26	28	20	„	La.	2−3, =3	6·4	
„ 27	29	45	„	Bh.	3−2	6·6	
„ 28	30	T.25	„	Bn.	6+2, 7+8	7·3	
„ 28	30	50	„	Ma.	6+4, 7+6	7·3	Pale red.
„ 28	30	t.22	„	Ni.	3−7, 0+2·5	7·1	
„ 29	31	30	„	Tn.	3−8, 6+3·5	7·2	
„ 31	33	25	„	Bo.	3−4, 6+8	6·8	
„ 31	33	T.50	„	Bn.	6+1·5	7·4	
„ 31	33	45	2	Bh.	3−4, 6+8	6·8	Very red.
1914.							
Jan. 1	34	40	1	Bc.	0+3	7·0	
„ 2	35	45	„	Br.	3−4, 6+8	6·8	
„ 4	37	60	„	Th.	6−1, 7+4	7·7	
„ 6	39	45	„	Bh.	3−3, 6+9	6·7	
„ 6	39	60	2	Th.	6+2	7·3	
„ 11	44	t.22	1	Ni.	6−3, 7+3	7·8	
„ 14	47	24	„	Bo.	5−1·5, =6	7·5	
„ 14	47	90	„	Bh.	6−3, 7+3	7·8	
„ 14	47	30	„	Tn.	=6	7·5	
„ 17	50	t.22	„	Ni.	7−3, 13+3	8·4	
„ 18	51	90	„	Bh.	=7, 6−5, 12+7·5	8·1	
„ 18	0151	50	„	Ma.	6−4, 7+1	8·0	

(7120) χ CYGNI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Jan. 22	0155	79	1	Ma.	7+1	8·0	
,, 23	56	45	,,	Br.	6−4, 7+2	7·9	
,, 23	56	T.50	,,	Bn.	6−4, 7+1	8·0	
,, 23	56	40	,,	La.	7−1, 9+1	8·3	
,, 24	57	24	2	Bo.	6−4·5, 7+1	8·0	
,, 25	58	90	1	Bh.	12+2, 13+1, 16+5	8·6	
,, 26	59	60	2	Th.	6−4, 7+1	8·0	
Feb. 1	65	,,	1	,,	=9	8·4	
,, 1	65	t.22	,,	Ni.	7−4·5, 13+1	8·6	
,, 3	67	24	2	Bo.	13−2, 16+2	8·8	
,, 3	67	90	,,	Bh.	12−2, 20+4	9·0	
,, 3	67	40	1	La.	9−3, =13, 16+2	8·7	
,, 6	70	,,	,,	,,	9−3, =13, 16+2	8·7	
,, 8	72	114	2	Th.	=20	9·4	
,, 18	82	90	1	Bh.	20−3·5, 27+1	9·8	
,, 23	87	,,	,,	,,	27−3, 34−2, 51+3	10·2	
Mar. 2	0194	,,	2	,,	=51	10·5	
,, 12	0204	T.94	1	Ni.	34−1, 51+4	10·2	
,, 16	08	,,	,,	,,	34−4, 51+1	10·5	
,, 18	10	90	,,	Bh.	=54	10·8	
,, 21	13	45	2	Br.	51−3, 62+1	10·9	
,, 22	14	T.94	1	Ni.	34−4, 51+1	10·5	
,, 28	20	,,	,,	,,	51−3, 62+1·5	10·8	
,, 31	23	40	2	La.	87+1	11·8	
Apr. 6	29	150	1	Bh.	74−1, 87+1	11·8	
,, 12	35	,,	,,	,,	87−1, 92+1	12·1	
,, 12	35	T.94	,,	Ni.	62−3, 67+1	11·3	
,, 18	41	,,	,,	,,	67−3, 87+3	11·6	
,, 18	41	120	,,	Br.	87−1	12·0	
,, 22	45	150	,,	Bh.	=94, =97, =98	12·3	
,, 26	49	120	2	Br.	76−3, 97+3	11·9	
,, 26	49	T.94	1	Ni.	87−1, 92+1	12·1	
,, 27	50	150	,,	Bh.	94−1, 98+1	12·4	
May 10	63	,,	,,	,,	=94, =96, =97	12·3	
,, 15	68	T.94	,,	Ni.	92−4, 107+2·5	12·6	
,, 16	69	120	2	Br.	=104	12·7	About, difficult.
,, 16	69	150	1	Bh.	97−1, 101+1	12·3	
,, 17	70	T.200	,,	Bn.	=94	12·3	
,, 25	78	150	,,	Bh.	=104, =107	12·7	
,, 26	79	160	,,	Br.	104−4, =107, $\varkappa$+2	12·9	
,, 30	83	T.94	,,	Ni.	107−4	13·2	
June 10	94	157	2	Th.	107−3	13·1	
,, 10	94	150	1	Bh.	=$\varkappa$	13·2	
,, 13	97	,,	,,	,,	=$\varkappa$	13·2	
,, 13	97	T.94	2	Ni.	107−3	13·1	
,, 14	98	240	1	Br.	107−2	13·0	
,, 15	0299	150	,,	Bh.	=$\varkappa$, =λ	13·3	
,, 19	0303	157	2	Th.	λ+1	13·3	
,, 25	09	,,	1	,,	107−3	13·1	
,, 25	0309	150	,,	Bh.	$\varkappa$−2, =λ	13·4	

(7120) χ CYGNI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
June 27	0311	120	1	Br.	$\varkappa-1$, $\lambda+1$	13·3	
,, 29	13	150	,,	Bh.	$\varkappa-1·5$	13·3	
,, 30	14	T.94	,,	Ni.	107−4	13·2	
July 3	17	157	2	Th.	107−5	13·3	
,, 10	24	150	1	Bh.	$\varkappa-2$, $=\lambda$	13·4	
,, 12	26	T.94	,,	Ni.	107−2	13·0	
,, 13	27	150	2	Bh.	107−2, $\varkappa+2$	13·0	
,, 16	30	T.94	,,	Ni.	107−3	13·1	
,, 18	32	150	1	Bh.	97−2, 102+2	12·3	
,, 20	34	T.94	,,	Ni.	=107	12·8	
,, 20	34	183	,,	Ma.	97−2	12·4	
,, 23	37	,,	2	,,	87−2, 92+0·5	12·1	Difficult.
,, 27	41	,,	,,	,,	92−1	12·3	About.
,, 27	41	T.94	1	Ni.	92+1	12·1	
,, 30	44	150	,,	Bh.	=97	12·2	
,, 30	44	157	,,	Th.	67−4, 87+1	11·8	
Aug. 2	47	T.94	,,	Ni.	67−1·5, 87+4	11·5	
,, 3	48	160	,,	Br.	67−3, 87+3	11·6	
,, 3	48	150	,,	Bh.	74−4, 87−1, 92+1·5, 97+2	12·0	
,, 3	48	183	,,	Ma.	62−7, 87+1·5	11·7	
,, 3	48	157	,,	Th.	67−3, 87+3	11·6	
,, 7	52	90	,,	Bh.	=81, =87	11·8	
,, 10	55	40	,,	La.	62−2, 67+2	11·2	
,, 10	55	T.94	,,	Ni.	62+1	10·9	
,, 11	56	157	,,	Th.	56−1, 67+3	11·0	
,, 12	57	90	,,	Bh.	51−4, 62−1, 67+4,	11·0	
,, 14	59	,,	,,	,,	=56, =58	10·9	
,, 14	59	60	,,	Th.	58+1	10·8	
,, 16	61	90	,,	Bh.	34−4, =51, 58+4	10·5	
,, 17	62	45	,,	,,	=34	10·1	
,, 17	62	T.94	,,	Ni.	20−8, 51+3	10·2	
,, 17	62	30	,,	Tn.	=51	10·5	
,, 18	63	40	,,	La.	36−2, 51+1	10·4	
,, 21	66	160	,,	Br.	=34	10·1	
,, 21	66	90	,,	Bh.	20−3, =27, 34+3	9·8	
,, 21	66	60	,,	Th.	27−1·5, 51+5	10·0	
,, 22	67	T.94	,,	Ni.	=34	10·1	
,, 26	71	40	,,	La.	21−1, 27+2	9·7	
,, 26	71	157	,,	Th.	=27	9·9	
,, 26	71	30	,,	Tn.	20−2, 27+2	9·6	
,, 27	72	T.95	,,	Bn.	18−4, 27+1	9·7	
,, 30	75	T.94	,,	Ni.	=20	9·4	
Sept. 1	77	T.50	,,	Bn.	13−5, 18+1	9·2	
,, 1	77	40	,,	Bc.	=16, 18+3	9·0	
,, 1	77	90	,,	Bh.	7−5, =13, 14+5	8·6	
,, 5	81	45	,,	,,	6−6, 7−1, 9+1, 12+6	8·2	
,, 5	81	60	2	Th.	12+2	8·6	
,, 6	82	T.94	1	Ni.	13−4·5, 20+3	9·1	
,, 8	84	40	,,	Bc.	9−2, 13+1	8·6	
,, 10	86	45	,,	Br.	7−2, 13+4	8·3	
,, 10	86	90	,,	Bh.	=7	8·1	Pale red.
,, 10	0386	60	,,	Th.	7−2	8·3	

(7120) χ CYGNI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Sept. 11	0387	T.50	1	Bn.	7−3·5, 13+2	8·5	
„ 11	87	t.22	„	Ni.	7−4·5, 13+1	8·6	
„ 11	87	30	2	Tn.	=7	8·1	
„ 13	89	20	1	La.	9−3, =13, 16+3	8·7	
„ 14	90	40	„	Bc.	7−1, 9+2	8·2	
„ 15	91	45	„	Bh.	6−3, 7+3	7·8	
„ 15	91	60	„	Th.	6−1, 7+4	7·7	
„ 17	93	t.22	„	Ni.	7−3, 13+2	8·4	
„ 19	95	T.50	„	Bn.	6−4, 7+1	8·0	
„ 19	95	30	„	Tn.	=6	7·5	
„ 20	96	40	„	Bc.	6−5, 7+1	8·0	
„ 23	99	45	„	Br.	6−3, 7+3	7·8	
„ 23	0399	t.22	„	Ni.	6−4, 7+1	8·0	
„ 24	0400	T.50	„	Bn.	6−4, 7+1	8·0	
„ 24	00	60	„	Th.	=6	7·5	
„ 25	01	90	„	Bh.	=6, 7+5	7·6	
„ 27	03	T.50	„	Bn.	6−3, 7+3	7·8	
„ 29	05	„	„	„	6−4, 7+2	7·9	
„ 29	05	45	„	Bh.	6+5	7·0	Very red.
„ 29	05	60	„	Th.	6−1	7·6	
„ 29	05	30	„	Tn.	=5	7·4	
Oct. 3	09	60	„	Th.	6+2	7·3	
„ 4	10	40	„	Bc.	0−3, 6−1	7·6	
„ 4	10	45	„	Bh.	3−4, 6+8	6·8	Very red.
„ 5	11	20	„	La.	4−5, 6+2	7·3	
„ 5	11	30	„	Tn.	3−10, 6+1	7·4	
„ 6	12	t.22	„	Ni.	=6	7·5	
„ 7	13	60	2	Th.	6+4	7·1	
„ 10	16	45	1	Br.	3−5, 6+6	6·9	
„ 10	16	60	2	Th.	6+5	7·0	
„ 11	17	T.50	1	Bn.	6−1, 7+4	7·7	
„ 12	18	t.22	„	Ni.	=6	7·5	
„ 14	20	45	„	Bh.	6+5	7·0	
„ 18	24	„	„	„	3−4, 6+7	6·8	
„ 18	24	30	„	Tn.	3−7, 5+3	7·1	
„ 18	24	T.25	„	Bn.	=n	6·9	
„ 20	26	40	„	Bc.	3−4, 0+5	6·8	
„ 21	27	20	„	La.	3−2, =4	6·7	
„ 21	27	60	2	Th.	6+3	7·2	
„ 22	28	45	1	Br.	=3	6·4	
„ 24	30	30	„	Tn.	3−3, 5+7	6·7	
„ 27	33	90	„	Bh.	2−3, =3	6·4	
Nov. 2	39	t.22	„	Ni.	g−4, 3+4	6·0	
„ 3	40	60	2	Th.	2+2	5·9	
„ 7	44	B.	1	Br.	2−1, 3+2	6·2	
„ 7	44	45	„	Bh.	2+5	5·6	In F. 5·6.
„ 7	44	30	„	Tn.	=3	6·4	
„ 7	44	40	„	Th.	2+2	5·9	
„ 7	44	„	„	Bc.	h−2, 2+2	5·9	
„ 10	47	20	„	La.	1−5, g+2, h+3	5·4	
„ 12	49	B.	„	Br.	g−2, 2+3	5·8	
„ 12	49	„	„	Ni.	g−3, 3+6	5·8	
„ 13	50	„	„	Bn.	1−3, g+1	5·4	
„ 14	0451	F.	„	Bh.	1−3, g+3	5·3	In B. 5·3.

(7120) χ CYGNI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Nov. 14	0451	F.	1	Tn.	1−8, 2+2	5·9	
,, 16	53	B.	,,	Bn.	1−3, g+1	5·4	
,, 16	53	,,	,,	Ni.	1−4·5, g+1	5·5	
,, 17	54	F.	,,	Bh.	=1	5·1	In B. 5·1.
,, 17	54	,,	,,	Th.	g−2	5·8	
,, 19	56	B.	,,	Bn.	1−3, g+2	5·4	
,, 20	57	F.	,,	Bh.	=1	5·1	
,, 21	58	B.	,,	Th.	1−3, g+3	5·3	
,, 21	58	,,	,,	Ni.	1−4, g+1	5·5	
,, 23	60	F.	,,	Tn.	1−3, g+3	5·3	
,, 27	64	B.	,,	Br.	1−2, g+3	5·3	
,, 27	64	45	,,	Bh.	=1	5·1	In F. 5·1.
,, 27	64	20	,,	La.	c−6, R−1, 1+3	4·7	
,, 27	64	F.	,,	Th.	1−2, g+3	5·3	
Dec. 1	68	,,	,,	Bh.	=1	5·1	
,, 2	69	B.	,,	Ni.	1−1·5, g+4	5·2	
,, 4	71	,,	,,	Br.	1−1	5·2	
,, 4	71	,,	,,	Bc.	1−1	5·2	
,, 5	72	,,	,,	Bn.	R−2, 1+1	5·0	
,, 5	72	,,	,,	Ni.	1−0·5, g+4	5·1	
,, 7	74	45	,,	Bh.	1−1, g+4	5·2	
,, 7	74	B.	,,	Th.	1−1, g+4	5·2	
,, 8	75	,,	,,	Bn.	R−1, 1+1	4·9	
,, 8	75	,,	,,	Ni.	1−0·5	5·1	
,, 12	79	,,	,,	Bc.	1+2	4·9	
,, 13	80	,,	2	Br.	=1	5·1	
,, 14	81	,,	1	Ni.	1−1·5, g+4	5·2	
,, 15	82	F.	,,	Tn.	=1	5·1	
,, 20	87	B.	,,	Br.	1−1	5·2	
,, 20	87	45	,,	Bh.	1+2	4·9	
,, 20	87	F.	,,	Tn.	1−2, 2+8	5·3	
,, 20	87	B.	,,	Ni.	1−1, g+4	5·2	
,, 23	90	20	,,	La.	R−3, 1+3	4·9	Orange.
,, 24	91	B.	,,	Ni.	1−1, g+4	5·2	
,, 26	93	,,	,,	Br.	1−2, g+3	5·3	
,, 26	93	45	,,	Bh.	=1	5·1	
,, 26	93	30	,,	Tn.	=1	5·1	In F. 5·4.
,, 30	97	45	2	Bh.	1+2	4·9	In F. 4·9.
,, 30	97	B.	1	Ni.	1−1·5, g+3	5·2	
,, 31	0498	,,	,,	Br.	1−4, g+1	5·5	

(7560) R VULPECULÆ. (V. 1.)

H.D. 205923.

NOTES.

Star P = B.D. + 23° 4243, 8·40 m. estimated.

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
Apr. 23	9150	66	2	F.G.B.	=40	11·4	
May 22	9179	45	1	,,	5−1, 4+1	8·7	
June 17	9205	,,	,,	Bi.	3−3, 5+9	7·7	
,, 21	09	,,	,,	F.G.B.	3−11, 5+1	8·5	
,, 26	14	,,	,,	Bi.	3−10, 5+2	8·4	
July 2	20	,,	,,	,,	5−2, 9+5	8·8	
,, 5	23	,,	,,	,,	=6	9·1	
,, 10	28	,,	,,	F.G.B.	9−1, 11+1	9·4	
,, 11	29	,,	,,	Bi.	9−2, =11	9·5	
,, 18	36	,,	2	,,	19−2, 25+3	10·0	
,, 21	39	66	1	F.G.B.	=31	10·9	
,, 24	42	200	,,	Bi.	35−1, 40+2	11·1	
,, 28	46	,,	,,	,,	40−3, 57+2	11·7	
,, 30	48	,,	,,	,,	57−1, 59+1	11·9	
Aug. 1	50	,,	,,	,,	55−1, 59+1	11·9	
,, 7	56	160	,,	Br.	57−1, 59+1	11·9	
,, 17	66	200	,,	Bi.	71−2	12·7	
,, 24	73	,,	,,	,,	71−2	12·7	
,, 24	73	198	,,	F.G.B.	71−2, 79+2	12·7	
,, 27	76	120	2	Gh.	=59	12·0	Glimpsed difficult.
Sept. 3	83	240	1	Br.	57−1, 63+2	11·9	
,, 16	9296	120	2	Gh.	=29, =31	10·7	
,, 20	9300	66	1	F.G.B.	=24, 28+2	10·3	
,, 21	01	160	,,	Br.	19−1	9·9	
,, 24	04	30	,,	Gh.	=19	9·8	
Oct. 1	11	45	,,	F.G.B.	5−4, 9+4	9·0	
,, 10	20	30	2	Gh.	3−6, 5+6	8·0	
,, 17	27	,,	,,	,,	2−4, 3−2	7·6	
,, 21	31	45	1	Br.	2−4, 3−2	7·6	
,, 25	35	30	2	Gh.	3−6, 5+6	8·0	
,, 30	40	,,	1	,,	3−8, 4+5·5	8·2	
,, 31	41	45	2	F.G.B.	3−4, 4+8	7·9	
Nov. 6	47	,,	1	,,	3−11, 5+1	8·5	
,, 6	47	,,	,,	Br.	3−9, 4+4	8·4	
,, 12	53	30	,,	Gh.	=5	8·6	
,, 20	61	60	,,	Br.	5−1·5, 6+3	8·8	
Dec. 3	74	160	,,	,,	19−3, 25+2	10·1	
,, 4	9375	45	,,	F.G.B.	=19	9·8	

(7560) R VULPECULÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
Dec. 9	9380	120	1	Gh.	=31	10·9	
„ 15	86	105	„	F.G.B.	31−3, 40+1·5	11·2	
„ 17	9388	160	„	Br.	40−2, 57+3	11·6	
1912.							
Jan. 5	9407	132	2	F.G.B.	40−1·5, 57+3	11·5	
„ 9	11	„	1	„	40−3, 57+1·5	11·7	
Feb. 2	9435	160	2	Br.	9−2, =16, 19+2	9·7	
June 6	9560	240	1	„	57−2, 63+2	12·0	
„ 6	60	132	„	F.G.B.	57−2, 63+2	12·0	
„ 11	65	120	„	Gh.	=57	11·8	
„ 21	75	„	2	„	=27	10·5	
„ 23	77	160	1	Br.	19−2, 23+2	10·0	
July 10	9594	t.22	2	Bl.	=7	9·3	
„ 25	9609	45	„	Bh.	=5	8·6	
„ 27	11	„	„	„	=4, =5	8·7	
„ 30	14	„	„	„	4−3, =6, 7+3	9·1	
Aug. 1	16	t.22	1	Bl.	4+1, =5	8·6	
„ 2	17	45	„	Bh.	4−3, 6−1, 7+1, 10+3	9·2	
„ 11	26	„	2	„	5−4, =6, 7+4	9·0	
„ 19	34	„	1	„	9−2, =11, 13+2	9·5	
„ 20	35	T.94	2	Bl.	7−1, 11+1	9·4	In t.22, 9·4.
„ 27	42	90	„	Bh.	=13, 10−1, 14+1	9·6	
„ 29	44	45	1	„	=13	9·7	
Sept. 2	48	90	2	„	24−3, =29, 31+3	10·6	
„ 2	48	160	1	Br.	=29	10·6	
„ 4	50	T.94	„	Bl.	29−4, 38+1	11·1	
„ 6	52	90	2	Bh.	29−3, =37, 40+3	11·1	
„ 9	55	„	„	„	=55, =56, =59	11·9	
„ 12	58	T.94	1	Bl.	57−3, 71+3	12·1	
„ 17	63	150	2	Bh.	=57, =59	11·9	
„ 20	66	160	„	Br.	57−1, 59+1	11·9	
„ 21	67	T.94	„	Bl.	=79	12·9	
Oct. 2	78	„	1	„	79−2	13·1	Difficult.
„ 4	80	150	2	Bh.	=71, =73	12·5	
„ 5	81	T.94	1	Bl.	79−3	13·2	Difficult.
„ 7	83	150	2	Bh.	=59	12·0	
„ 8	84	T.94	„	Bl.	79−5	13·4	Difficult.
„ 10	86	240	„	Br.	66−2	12·5	About.
„ 15	91	T.94	1	Bl.	79−1	13·0	Difficult.
„ 17	93	90	2	Bh.	40−3, =49, 59+3	11·7	
„ 22	9698	„	„	„	36−3, =40, 49+3	11·3	
„ 29	9705	„	1	„	25−3, =31, 36+3	10·7	
„ 29	05	160	„	Br.	31−2, 40+3	11·1	
„ 31	07	90	„	Bh.	25−1, =26, =27, 28+1	10·5	
Nov. 1	08	40	„	La.	28−1·5, 31+1	10·8	
„ 2	9709	160	„	Br.	25−1, 31+4	10·5	

(7560) R VULPECULÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Nov. 3	9710	90	1	Bh.	23−1, =25, 26+1	10·4	
" 7	14	"	"	"	=13, =19	9·8	
" 7	14	40	2	La.	19−1, 24+4	9·9	
" 9	16	45	1	Bh.	9−1, 11+1	9·4	
" 11	18	90	"	"	9−2, 11−1, 13+1, 19+2	9·6	
" 12	19	40	2	La.	=6	9·1	Red.
" 12	19	T.94	1	Bl.	7−0·5, 11+2	9·4	
" 17	24	45	"	Bh.	4−3, =6, 7+3	9·1	
" 20	27	90	2	"	=4	8·8	
" 20	27	40	"	La.	4−1	8·9	About.
" 25	32	"	"	"	=4	8·8	
" 26	33	45	1	Bh.	3−9, 4+4·5	8·3	
" 28	35	t.22	"	Bl.	2−13, 4+2	8·6	
" 30	37	45	2	Bh.	3−7, 4+7	8·1	
Dec. 3	40	40	1	La.	3−7, 5+4·5	8·1	
" 4	41	45	"	Br.	3−9, 4+4	8·4	
" 5	42	t.22	"	Bl.	2−11, 4+4·5	8·3	
" 5	42	20	2	La.	3−5, 5+6·5	7·9	
" 7	44	"	1	"	3−4·5, 5+7	7·9	
" 8	45	45	"	Bh.	2−8, 3−6, 4+8, 5+6	8·0	
" 9	46	20	"	La.	3−3, 5+9	7·7	
" 10	47	45	2	Bh.	3−4, 5+8	7·8	
" 11	48	20	1	La.	3−4, 5+8	7·8	
" 13	50	45	2	Bh.	2−8, 3−6, 4+8, 5+6	8·0	
" 16	53	"	1	"	2−10, 3−8, 4+5, 5+4	8·2	
" 23	60	"	"	"	3−10, =5, 4+3·5	8·5	
" 23	60	"	"	Br.	5+4	8·2	
" 25	62	"	2	Bh.	4−3, =6, 7+3	9·1	
" 28	65	"	1	"	=4, 5−2, 6+2	8·8	
" 29	66	T.94	"	Bl.	4−1·5, 7+4	8·9	
" 31	68	45	2	Bh.	4−3, =6, 7+3	9·1	
1913.							
Jan. 2	70	"	"	"	5−4, =6, 7+4	9·0	
" 2	70	"	1	Br.	=4, =5	8·7	
" 5	73	"	2	Bh.	6−2, =9, 11+2	9·3	
" 6	74	40	"	La.	6−3, 11+1·5	9·4	
" 8	76	T.94	1	Bl.	7−1, 11+1	9·4	
" 12	80	45	2	Bh.	12−2, =13, 16+2	9·7	
" 18	86	90	"	"	=13, =19	9·8	
" 25	93	120	1	Br.	31−1, 40+4	11·0	
" 26	94	90	2	Bh.	=35, =36	11·0	
" 31	9799	"	"	"	29−3, =40, =43, 49+6	11·2	
Feb. 4	9803	"	3	"	=40, =43, =49	11·5	
" 8	07	"	"	"	=54, =55, =57, =59	11·9	
" 21	20	"	1	"		<12·0	Not seen.
" 27	26	"	"	"	=20	10·1	
Mar. 4	31	"	"	"	13−2, 20+2	9·9	
" 11	38	"	2	"	11−4, =13, =19, 25+4	9·9	
" 27	9854	45	1	"	5−5, =6, 7+2·5	9·1	

(7560) R VULPECULÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Apr. 1	9859	45	1	Bh.	5−2, 6+2, =8	9·0	
,, 7	65	t.22	,,	Bl.	=4	8·8	
,, 17	75	45	2	Bh.	2−8, 3−6, 4+8, 5+6	8·0	
,, 25	83	,,	,,	,,	3−4·5, 4+9	7·9	
,, 26	84	t.22	1	Bl.	2−12·5, 4+3	8·5	
,, 27	85	45	,,	Bh.	3−8, 4+3, 5+1, 6+8	8·4	
,, 28	86	,,	,,	,,	4+1, 5−1	8·7	
,, 28	86	,,	,,	Br.	4+2	8·6	
May 2	90	,,	2	Bh.	=4, 5−2, 6+2	8·8	
,, 2	90	40	1	La.	4+3, 5+2	8·4	
,, 5	93	,,	,,	,,	4+3, 5+1	8·5	
,, 7	95	,,	,,	,,	4+2, 5+1	8·5	
,, 10	9898	45	2	Br.	=4, =5	8·7	
,, 14	9902	,,	1	Bh.	4−2, 6+2, 7+4	8·9	
,, 14	02	T.94	,,	Bl.	=4	8·8	
,, 18	06	40	,,	La.	4−2, 5−2, 6+2	8·9	
,, 22	10	90	2	Bh.	6−1, 9+1	9·2	
,, 24	12	40	1	La.	4−3, 6+1	9·0	
,, 25	13	45	,,	Br.	4−2, 7+3	9·0	
,, 25	13	T.94	,,	Bl.	4−3, 7+3	9·1	
,, 28	16	40	2	La.	6−1, 11+4	9·2	
,, 31	19	45	1	Br.	6−2, 9+1	9·3	
,, 31	19	T.94	,,	Bl.	7−0·5, 11+1	9·4	
June 1	20	40	2	Gi.	=7	9·3	
,, 1	20	,,	1	La.	=11, 19+4	9·5	
,, 3	22	,,	2	,,	11+1, 19+4	9·4	
,, 4	23	45	1	Bh.	9−2, =11, 19+2	9·6	
,, 7	26	,,	2	,,	=13, 19−1	9·8	
,, 7	26	160	1	Br.	11−1, 19+1	9·7	
,, 7	26	T.94	,,	Bl.	11−2, 19+0·5	9·7	
,, 8	27	40	,,	La.	=19, 21+5	9·8	
,, 12	31	T.94	,,	Bl.	=29	10·6	
,, 12	31	40	2	La.	31−1·5, 40+3	11·0	
,, 14	33	45	,,	Bh.	29−5, =35, =36, 49+5	11·1	
,, 21	40	90	1	,,	29−6, 43+2	11·2	
,, 22	41	T.94	,,	Bl.	57−1, 71+4·5	12·0	
,, 23	42	40	,,	La.	40−2	11·6	
,, 27	46	90	2	Bh.	57−2, =59	12·0	
,, 29	48	60	1	Gh.	=61	12·0	
,, 30	49	150	2	Bh.	66−2, 75+2	12·5	M.
July 8	57	,,	1	,,	59−5, =66	12·4	
,, 8	57	T.94	,,	Bl.	79−2	13·1	
,, 16	65	,,	,,	,,	57−5, =79	12·6	
,, 19	68	90	,,	Bh.	=45, =49	11·5	
,, 23	72	T.94	,,	Bl.	=57	11·8	
,, 25	74	90	2	Bh.	=40, =43	11·4	
,, 25	74	183	,,	Ma.	=57	11·8	About.
,, 30	79	150	1	Bh.	27−4, 35−2, 38+2, 40+2	11·1	
,, 30	9979	T.94	,,	Bl.	29−5, 38+1	11·1	

(7560) R VULPECULÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Aug. 2	9982	160	1	Br.	29−1, 31+1	10·7	
,, 3	83	T.94	,,	Bl.	19−3, 38+10	10·1	
,, 4	84	90	,,	Bh.	25−3, 31+3	10·6	
,, 5	85	183	,,	Ma.	25−3, 31+3	10·6	
,, 6	86	T.94	,,	Bl.	11−2, 19+0·5	9·7	
,, 9	89	90	2	Bh.	13−2, =19	9·9	
,, 14	94	T.94	1	Bl.	7−1, =11	9·5	
,, 16	9996	90	2	Bh.	9−1·5, =11, 19+3	9·5	
,, 20	0000	,,	1	,,	6−2, =9, 11+2	9·3	
,, 24	04	,,	,,	,,	4−1, 5−4, 6+1, 7+4	8·9	
,, 24	04	45	,,	Br.	5−2, 6+2	8·8	
,, 30	10	,,	,,	Bh.	3−9, 5+3	8·3	
,, 30	10	t.22	,,	Bl.	2−13, 4+1·5	8·6	
Sept. 2	13	45	,,	Bh.	3−7, 4+7	8·1	
,, 4	15	t.22	,,	Bl.	3−3·5, 4+10	7·8	
,, 5	16	90	,,	Bh.	2−6, 3−4, 4+9, 5+8	7·8	
,, 7	18	45	,,	Br.	3−1	7·5	
,, 8	19	T.50	,,	Bn.	3−2·5, 4+11	7·7	
,, 8	19	t.22	,,	Bl.	2−6, 3−4	7·8	
,, 9	20	45	,,	Bh.	3−2, 5+10	7·6	
,, 20	31	,,	,,	,,	3−9, 5+3	8·3	
,, 24	35	,,	,,	Br.	4+1, 5+2	8·5	
,, 24	35	50	,,	Ma	=4	8·8	About.
,, 24	35	t.22	,,	Bl.	4+2	8·6	
,, 27	38	,,	,,	,,	4+1	8·7	
,, 27	38	45	,,	Bh.	=5	8 6	
,, 28	39	50	,,	Ma.	4−4, 7+2	9·2	
,, 30	41	T.50	,,	Bn.	4−2, =6	9·0	
Oct. 1	42	45	,,	Bh.	5−2, 6+3	8·8	
,, 3	44	T.94	,,	Bl.	=4	8·8	
,, 5	46	90	2	Bh.	13+5, 19+5	9·3	
,, 9	50	,,	1	,,	19+3	9·5	
,, 13	54	T.94	,,	Bl.	7−1, 11+1·5	9·4	
,, 16	57	90	2	Bh.	13+1, 19+1	9·7	
,, 19	60	160	1	Br.	=19	9·8	
,, 20	61	T.94	,,	Bl.	11−2, 19+1	9·7	
,, 22	63	90	,,	Bh.	19−5, 29+3·5	10·3	
,, 23	64	79	,,	Ma.	=27	10·5	About.
,, 28	69	T.94	,,	Bl.	29−4·5, 38+1	11·1	
,, 31	72	160	,,	Br.	40−2, 57+3	11·6	
,, 31	72	90	2	Bh.	31−3, 40+3	11·1	
,, 31	72	40	,,	La.	=31, =35	10·9	Difficult.
Nov. 3	75	90	,,	Bh.	40−1·5, 45−1, 57+3	11·5	
,, 4	76	T.94	1	Bl.	=57	11·8	
,, 7	79	150	2	Bh.	=57, =59	11·9	
,, 11	83	T.94	1	Bl.	57−2, 79+8	12·1	
,, 18	90	183	2	Ma.	57−2, =59	12·0	
,, 22	94	160	1	Br.	57−3, 63+1	12·1	
,, 22	0094	T.94	,,	Bl.	57−8, 79+2	12·7	
Dec. 1	0103	150	2	Bh.	57−2, 59−2	12·1	
,, 4	06	160	1	Br.	57−1, 59+1	11·9	
,, 9	0111	150	,,	Bh.	=49, 55+2	11·6	

(7560) R VULPECULÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Dec. 13	0115	T.94	1	Bl.	19−4, 29+4	10·2	
,, 16	18	150	2	Bh.	25−3, =29, 31+3	10·6	
,, 18	20	T.95	1	Bn.	=19	9·8	
,, 18	20	T.94	,,	Bl.	=11	9·5	
,, 21	23	150	,,	Bh.	=11, 19+2	9·6	
,, 21	23	40	,,	La.	11−2, 19+1	9·7	
,, 24	26	160	,,	Br.	9−1, 11+1	9·4	
,, 24	26	90	,,	Bh.	6−1, 9+1	9·2	
,, 27	29	40	,,	La.	=6, 9+3, 11+4	9·1	
,, 28	30	T.50	,,	Bn.	6−1, 9+1	9·2	
,, 28	30	183	,,	Ma.	6+0·5, 19+5	9·2	
,, 30	32	T.50	,,	Bn.	6−0·5, 9+2	9·1	
,, 30	32	79	,,	Ma.	9+3, 19+4	9·2	
,, 30	32	45	2	Bh.	4−2, 5−3, 6+1·5, 7+4	8·9	
1914.							
Jan. 2	35	,,	1	Br.	5−1·5, 6+3	8·8	
,, 6	39	,,	,,	Bh.	5−1, 4+1	8·7	
,, 11	44	,,	2	,,	3−7, 5+4·5	8·1	
,, 14	47	,,	1	,,	3−4·5, 5+7	7·9	
,, 14	47	t.22	,,	Bl.	P−2·5, 4+1	8·7	
,, 22	55	T.94	,,	,,	=3	7·4	
,, 23	56	45	,,	Br.	=3	7·4	
,, 23	56	90	,,	Bh.	3−2, 5+9	7·7	
,, 25	58	45	,,	,,	2−2, =3	7·4	
,, 29	62	,,	,,	,,	3−6, 5+6	8·0	
,, 31	64	t.22	2	Bl.	3−2·5, P+7	7·7	
Feb. 3	67	45	1	Bh.	3−7·5, 5+4	8·2	
,, 10	74	T.94	,,	Bl.	P−1, 4+2	8·5	
,, 15	79	45	,,	Bh.	4+1, 5−1	8·7	
,, 19	83	90	,,	,,	5−4, =6, 7+4	9·0	
,, 23	87	,,	,,	,,	6−4, =11, 13+4	9·4	
,, 26	0190	,,	,,	,,	11−3, =13, =19, 20+3	9·8	
Mar. 12	0204	150	,,	,,	=40, 49+2	11·4	
,, 21	13	,,	,,	,,	=57, =59	11·9	
,, 25	17	,,	,,	,,	=59	12·0	
,, 31	23	T.94	,,	Bl.	79−7	13·6	Doubtful. [C.L.B.] V. faint.
April 1	24	90	2	Bh.	=57, =59	11·9	
,, 6	29	150	1	,,	59−5, 66−2	12·5	
,, 12	35	,,	,,	,,	66−3, 71−2	12·6	
,, 14	37	,,	,,	,,	59−4, =71	12·4	
,, 14	37	T.94	,,	Bl.	59−7, 79+1·5	12·7	
,, 16	39	150	,,	Bh.	57−1, =59, 66+1	12·0	
,, 20	43	T.94	,,	Bl.	57−5, 79+5	12·4	
,, 26	49	,,	,,	,,	=57	11·8	
,, 26	49	90	,,	Bh.	45−2, =49, 54+2	11·6	
,, 30	53	,,	,,	,,	29−6, =37, 40+2	11·2	
May 2	55	,,	,,	,,	29−4, 40+4	11·0	
,, 2	0255	T.94	,,	Bl.	=38	11·2	

(7560) R VULPECULÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
May 3	0256	40	I	La.	31−6, =40	11·4	
,, 8	61	T.94	,,	Bl.	29−1·5, 38+4	10·8	
,, 9	62	90	,,	Bh.	25−3, =29, 31+3	10·6	
,, 14	67	,,	,,	,,	13−2, 19−1, 20+2	9·9	
,, 15	68	T.94	,,	Bl.	11−1·5, 19+1	9·7	
,, 17	70	60	,,	Gh.	=19	9·8	
,, 18	71	90	,,	Bh.	9−2, =11, 19+2	9·6	
,, 18	71	T.94	,,	Bl.	7−1, 11+1	9·4	
,, 21	74	40	2	La.	=11, 19+4	9·5	
,, 24	77	,,	I	,,	4−5, =6	9·2	
,, 25	78	45	,,	Bh.	5−4, 6+1, 13+7·5	9·0	
,, 26	79	,,	,,	Br.	=5	8·6	
,, 26	79	60	,,	Ga.	4−5, =6, 7+2, 13+5	9·2	
,, 30	83	t.22	,,	Bl.	P−1, 4+2	8·5	
,, 31	84	90	,,	Bh.	5−1, 4+1	8·7	
June 2	86	60	,,	Ga.	4+1, =5	8·6	
,, 3	87	90	,,	Bh.	3−4·5, 5+7	7·9	
,, 5	89	t.22	,,	Bl.	=P, 4+4	8·4	
,, 7	91	60	,,	Ga.	4+1, 5+3	8·5	
,, 10	94	,,	2	,,	3−3, 4+3, 5+4	8·1	
,, 10	94	90	I	Bh.	3−1	7·5	
,, 10	94	t.22	,,	Bl.	3−8, P+1	8·3	
,, 11	95	20	,,	La.	3−2	7·6	
,, 13	97	45	,,	Bh.	3−3, 4+10	7·8	
,, 13	97	t.22	,,	Bl.	3−8·5, P+2	8·2	
,, 14	98	45	,,	Br.	3−4, 4+7	8·0	
,, 15	0299	,,	,,	Bh.	3−7, 4+7	8·1	
,, 17	0301	20	,,	La.	3−3	7·7	
,, 17	01	t.22	,,	Bl.	3−8·5, P+2	8·2	
,, 19	03	45	,,	Bh.	3−4·5, 5+7	7·9	
,, 21	05	t.22	,,	Bl.	=P	8·4	
,, 22	06	45	,,	Bh.	3−5, 4+8	8·0	
,, 22	06	40	,,	La.	3−5	7·9	
,, 22	06	60	,,	Ga.	2−5, 3−1, 5+3	7·9	
,, 25	09	45	,,	Bh.	3−9, 4+4·5	8·3	
,, 25	09	20	,,	La.	3−6, 4+3, 5+4	8·2	
,, 26	10	t.22	2	Bl.	P−2, 4+2	8·6	
,, 27	11	45	I	Br.	4+4	8·4	
,, 28	12	60	,,	Ga.	=4, =5	8·7	
,, 29	13	,,	,,	,,	=4, 5−1	8·7	
,, 30	14	50	,,	Ma.	=5	8·6	About.
July 1	15	20	,,	La.	4−4, 5−2, 6+5	8·8	
,, 2	16	T.94	,,	Bl.	4+1·5	8·6	
,, 3	17	40	,,	Bc.	h−1, 7+1	9·2	
,, 3	17	45	,,	Bh.	3−10, 5+2, 6+7	8·4	
,, 4	18	60	,,	Ga.	5−5, 6+2, 9+5	8·9	
,, 6	20	50	,,	Ma.	5−4·5, 9+3	9·0	
,, 7	21	60	2	Ga.	6−2, =9	9·3	
,, 8	22	45	,,	Bh.	3−10, 4+2·5, =5	8·5	
,, 9	23	T.94	,,	Bl.	4−4, 7+1·5	9·2	
,, 10	24	40	I	Bc.	h−1, 7+1	9·2	
,, 13	27	90	,,	Bh.	=11, 19+3	9·5	
,, 13	27	40	,,	La.	11−2, 19+2	9·7	
,, 17	0331	,,	,,	Bc.	7−1, 11+1	9·4	

(7560) R VULPECULÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
July 17	0331	79	1	Ma.	11−1, 19+1	9·7	
,, 18	32	90	,,	Bh.	13−2, =19, 20+2	9·9	
,, 19	33	40	2	La.	25−4, 31−2, 40+6	10·9	
,, 19	33	60	,,	Ga.	19−5, =29	10·5	Difficult.
,, 20	34	90	1	Bh.	19−4, =23, 25+1	10·2	
,, 23	37	183	2	Ma.	40+2, 57+2	11·4	
,, 28	42	40	,,	La.	=40	11·4	
,, 28	42	90	1	Bh.	=40, =43, =45	11·4	
,, 30	44	150	,,	,,	40−2, 45−1, 52+1, 54+2	11·6	
Aug. 3	48	,,	,,	,,	55−3, =59, 66+1·5	12·1	
,, 12	57	90	,,	,,	=66	12·3	
,, 14	59	150	,,	,,	78−1, 79−1	13·0	
,, 16	61	,,	,,	,,	70−1, 75+1	12·6	
,, 21	66	,,	2	,,	66−2, =70	12·5	
,, 21	66	240	1	Br.	63−5	12·6	About, glimpsed.
,, 23	68	90	,,	Bh.	=66	12·3	
,, 26	71	,,	,,	,,	55−2, 57−3, 66+2, 70+3	12·1	
Sept. 1	77	150	,,	,,	=54, =55	11·8	
,, 5	81	90	2	,,	49−1, 54+1	11·7	
,, 10	86	,,	,,	,,	45−1, 49+1	11·5	
,, 10	86	120	1	Br.	57−3, 63+1	12·1	
,, 15	91	90	,,	Bh.	=40	11·4	
,, 18	94	,,	,,	,,	29−2·5, =31, 40+5	10·9	
,, 22	98	,,	2	,,	29−1·5, 40+6	10·8	
,, 23	0399	160	1	Br.	40+1	11·3	
,, 24	0400	T.120	,,	Bn.	29−3, 40+4·5	10·9	
,, 25	01	T.94	,,	Bl.	19−3, 29+6	10·1	
,, 25	01	90	,,	Bh.	20−1, 24+1	10·2	
,, 29	05	,,	,,	,,	19−2, 25+4	10·0	
,, 30	06	T.94	,,	Bl.	11−1·5, 19+1	9·7	
Oct. 4	10	45	,,	Bh.	9−2, =11, 19+2	9·6	
,, 4	10	40	,,	Bc.	11−1, 19+2	9·6	
,, 10	16	45	,,	Bh.	5−3, 6+1·5	8·9	
,, 11	17	60	,,	Ga.	=6, 9+5	9·0	
,, 11	17	T.94	,,	Bl.	4−5, 7+1	9·3	
,, 12	18	60	,,	Br.	=6	9·1	
,, 12	18	40	,,	La.	=6, 11+5	9·1	
,, 14	20	45	,,	Bh.	=5	8·6	
,, 18	24	,,	2	,,	2−8, 3−9, 4+8, 5+3	8·2	
,, 19	25	60	1	Ga.	=4, 5−2, 6+5	8·7	
,, 20	26	40	,,	Bc.	h−1, 7+1	9·2	
,, 21	27	20	,,	La.	e−2, f+2	8·3	
,, 26	32	60	,,	Ga.	=4, 5+2	8·6	
,, 27	33	90	2	Bh.	2−10, 3−9, 4+5, 5+3	8·3	
Nov. 2	39	t.22	,,	Bl.	P−0·5, 4+3	8·5	
,, 3	40	45	1	Bh.	2−10, 3−7, 4+5, 5+4·5	8·2	
,, 6	43	40	,,	Bc.	d−4, e−1	8·2	
,, 7	44	45	,,	Bh.	2−10, 3−8, 4+5, 5+4	8·2	
,, 10	0447	90	,,	,,	3−9, 4+4·5	8·3	

(7560) R VULPECULÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Nov. 10	0447	60	2	Ga.	=4, 5+2	8·6	
,, 11	48	,,	1	Br.	=4	8·8	
,, 14	51	t.22	2	Bl.	P−2, 4+2	8·6	
,, 16	53	,,	1	,,	=4	8·8	
,, 16	53	T.50	,,	Bn.	3−9, 5+2·5	8·3	
,, 17	54	45	,,	Bh.	5+1, 6+6	8·5	
,, 18	55	t.22	,,	Bl.	=4	8·8	
,, 20	57	90	,,	Bh.	4+2, 5−1	8·6	
,, 22	59	45	,,	,,	=5, 6+3, 7+5	8·7	
,, 27	64	90	2	,,	5−2, 6+2	8·8	
,, 27	64	160	1	Br.	9−1, 11+1	9·4	
,, 28	65	90	,,	Bh.	6−1, 7+1, =8	9·2	
Dec. 3	70	T.94	,,	Bl.	7−2, =11	9·5	
,, 4	71	40	,,	Bc.	11−1, 19+2	9·6	
,, 7	74	45	,,	Bh.	24−2, =26, 28+2	10·5	
,, 14	81	90	,,	,,	=40, =43	11·4	
,, 16	83	160	,,	Br.	40−2, 57+2	11·6	
,, 16	83	T.120	,,	Bn.	=40	11·4	
,, 20	87	150	,,	Bh.	=57, =59	11·9	
,, 26	0493	,,	,,	,,	57−1·5, 59−3	12·1	

(7609) T CEPHEI. (V. 3.)

H.D. 210868.

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Jan. 3	8675	t.60	2	Bn.	m−1, n+3·5	9·8	
,, 7	79	160	,,	Br.	m−3, n+1	10·0	
,, 8	80	t.22	1	Ni.	m−2, n+2	9·9	
,, 10	82	t.60	,,	Bn.	m−2·5, n+2	9·9	
,, 17	89	t.22	,,	Ni.	=m	9·7	
,, 19	91	t.60	,,	Bn.	m−3, n+1·5	10·0	
,, 25	97	,,	,,	,,	m−3, n+1·5	10·0	
,, 26	8698	T.120	,,	,,	m−1, n+2	9·8	
,, 30	8702	t.60	,,	,,	m−2, n+2	9·9	
Feb. 1	04	t.22	,,	Ni.	l−3, m+1	9·5	
,, 3	06	t.60	,,	Bn.	m−3, n+1·5	10·0	
,, 8	11	,,	,,	,,	m−2·5, n+2	9·9	
,, 9	12	t.22	,,	Ni.	m−1	9·8	
,, 11	14	t.60	,,	Bn.	m−1·5, n+3	9·8	
,, 11	14	45	,,	Br.	l−3, m+1	9·5	
,, 22	25	,,	,,	,,	=l	9·2	
Mar. 2	33	t.22	,,	Ni.	l−2, m+2	9·4	
,, 3	8734	60	,,	Br.	g−5, l+5	8·7	

(7609) T CEPHEI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Mar. 10	8741	45	1	Br.	g−3, l+6	8·5	
,, 13	44	t.22	,,	Ni.	k−3, =l	9·1	
,, 20	51	45	,,	Br.	f−2, g+3	7·9	
,, 22	53	t.30	,,	Bn.	g−3, k+2	8·5	
,, 27	58	t.22	,,	Ni.	h−5, k+1	8·7	
,, 31	62	45	,,	Br.	d−6, f+3	7·3	
Apr. 1	63	t.30	,,	Bn.	f−3, g+1	8·0	
,, 2	64	,,	,,	,,	f−3, g+1	8·0	
,, 12	74	t.22	2	Ni.	f−2, h+1	8·0	Yellowish orange.
,, 15	77	t.30	1	Bn.	e−4, f+1	7·6	
,, 21	83	45	2	Br.	=d	6·7	
,, 24	86	t.22	1	Ni.	d−3, e+2	7·0	Yellowish orange.
May 2	94	,,	,,	,,	d−1, e+3	6·8	In B. 7 5.
,, 7	99	80	,,	Br.	d+2	6·5	Reddish orange.
,, 7	8799	t.30	,,	Bn.	d−1·5, e+3	6·8	
,, 12	8804	t.22	,,	Ni.	d−2, e+2	6·9	In B. 7·5.
,, 14	06	t.30	,,	Bn.	d−2, e+2·5	6·9	
,, 18	10	60	,,	Br.	d+1	6·6	Very reddish orange.
,, 22	14	t.30	,,	Bn.	d−1, e+3·5	6·8	
,, 23	15	t.22	,,	Ni.	d−0·5	6·7	Yellowish orange.
,, 24	16	60	,,	Br.	d+2	6·5	
June 3	26	t.22	,,	Ni.	d+1	6·6	In B. 7·4.
,, 8	31	t.30	,,	Bn.	d−1, e+3 5	6·8	
,, 13	36	60	,,	Br.	d+4	6·3	
,, 14	37	t.30	,,	Bn.	d−1, e+3·5	6·8	
,, 19	42	,,	,,	,,	=d	6·7	
,, 26	49	50	,,	Ma.	d−5, h+10	7·2	Pale pink.
,, 29	52	B.	2	Ni.	e−2, f+3	7·4	
July 1	54	t.22	1	,,	d−1	6·8	
,, 4	57	50	2	Ma.	d−11, h+3·5	7·8	
,, 11	64	60	1	Br.	d+3	6·4	Reddish orange.
,, 12	65	50	,,	Ma.	=d	6·7	
,, 12	65	t.22	,,	Ni.	d+2	6·5	In B. 7·2.
,, 13	66	t.30	,,	Bn.	d+1·5	6·5	
,, 22	75	,,	,,	,,	d+2	6·5	
,, 22	75	50	,,	Ma.	d+3	6·4	
,, 25	78	,,	,,	,,	=d	6·7	Bright red.
,, 25	78	t.30	,,	Bn.	d+1	6·6	
,, 27	80	t.22	,,	Ni.	c−4, d+2	6·5	Yellowish orange. In B. 6·9.
,, 31	84	60	,,	Br.	d+4	6·3	
,, 31	84	t.30	,,	Bn.	d+2	6·5	
Aug. 2	86	B.	,,	Ni.	d−2, e+2	6·9	
,, 9	93	,,	,,	,,	d−1·5, e+3	6·8	
,, 9	93	45	,,	Br.	d+3	6·4	
,, 11	8895	B.	2	Bn.	c−5·5, d+1	6·6	
,, 19	8903	,,	1	,,	c−5·5, d+1	6·6	
,, 20	04	45	,,	Br.	d+3	6·4	Orange.
,, 25	09	B.	,,	Bn.	c−5, d+1	6·6	
,, 29	8913	,,	2	,,	d+2	6·5	

(7609) T CEPHEI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Aug. 29	8913	t.22	1	Ni.	d+5	6·2	In B. 6·7.
„ 31	15	45	„	Br.	d+6	6·1	
Sept. 3	18	B.	„	Bn.	c−5, d+1	6·6	
„ 11	26	t.30	„	„	d+3	6·4	
„ 12	27	B.	„	„	c−4, d+1	6·5	
„ 17	32	45	„	Br.	d+3	6·4	Orange red.
„ 25	40	t.22	2	Ni.	=e	7·1	
„ 27	42	t.30	1	Bn.	d−0·5, e+4	6·7	
„ 29	44	„	„	„	d−1, e+3·5	6·8	Very red.
„ 30	45	t.22	„	Ni.	d+0·5	6·6	In B. 7·3.
Oct. 6	51	t.30	„	Bn.	d−1, e+3·5	6·8	Very red.
„ 13	58	t.22	„	Ni.	d−2, e+2	6·9	Orange.
„ 22	67	„	„	„	d−2, e+2	6·9	
Nov. 1	77	t.30	„	Bn.	e−3·5, f+2	7·5	
„ 4	80	45	„	Br.	d−5, f+5	7·2	
„ 5	81	t.22	„	Ni.	f−3, h+1	8·0	
„ 11	87	45	„	Br.	f+3	7·4	
„ 11	87	t.30	„	Bn.	e−4·5, f+1	7·6	
„ 14	90	t.22	„	Ni.	h−2, k+4·5	8·3	
„ 20	96	45	„	Br.	f−2, g+3	7·9	
„ 20	8996	t.30	„	Bn.	f−3·5, g+1	8·1	
„ 25	9001	t.22	„	Ni.	h−6, k+1	8·7	
„ 28	04	t.30	„	Bn.	g−3, k+2	8·5	
Dec. 5	11	45	„	Br.	g+1, =h	8·1	
„ 7	13	t.22	„	Ni.	k−2, l+2	9·0	
„ 18	24	„	„	„	l−1	9·3	
„ 19	25	t.60	„	Bn.	l−3, m+1·5	9·5	
„ 20	26	60	„	Br.	g−6, l+4	8·8	
„ 24	30	t.60	„	Bn.	l−3·5, m+1	9·5	
„ 27	33	t.22	„	Ni.	l−3·5, m+1	9·5	
„ 29	35	t.60	„	Bn.	l−4, m+1	9·6	
„ 30	36	160	„	Br.	m−2, n+2	9·9	
1911.							
Jan. 1	38	t.60	„	Bn.	=m	9·7	
„ 7	44	„	„	„	m−1·5, n+3	9·8	
„ 9	46	„	„	„	m−2·5, n+2	9·9	
„ 10	47	t.22	2	Ni.	m−2	9·9	
„ 23	60	160	1	Br.	m−2, n+3	9·8	
„ 28	65	t.60	2	Bn.	n−1	10·2	
„ 29	66	t.22	1	Ni.	=n	10·1	
„ 30	67	t.60	„	Bn.	n+0·5	10·1	
„ 31	68	T.50	„	„	m−3, =n	10·0	
Feb. 19	87	t.60	„	„	m−3, n+1·5	10·0	
„ 19	87	t.22	„	Ni.	m−3·5, n+1	10·0	
„ 25	93	160	„	Br.	m−1·5, n+3	9·8	
„ 26	94	T.95	„	Bn.	n+1	10·0	
„ 26	9094	t.22	„	Ni.	m−2, n+2	9·9	

(7609) T CEPHEI—*continued.*

Date	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
Mar. 5	9101	t.22	2	Ni.	=m	9·7	
„ 7	03	T.50	„	Bn.	l−3, m+1·5	9·5	
„ 9	05	„	1	„	m+1	9·6	
„ 19	15	t.22	„	Ni.	l−1, m+4	9·3	
„ 21	17	T.50	„	Bn.	k−2, l+1	9·0	
„ 29	25	t.22	„	Ni.	h−6, k+1	8·7	
Apr. 3	30	45	„	Br.	f−3, g+2	8·0	
„ 3	30	T.50	„	Bn.	f−3·5, g+1	8·1	
„ 5	32	t.22	„	Ni.	h−4·5, k+2	8·6	
„ 15	42	„	„	„	h−4, k+2·5	8·5	
„ 16	43	t.30	„	Bn.	f−3, g+1	8·0	
„ 19	46	45	„	Br.	=f	7·7	
„ 29	56	„	„	„	f−1	7·8	
„ 30	57	t.22	„	Ni.	h+1	8·0	
May 4	61	t.30	„	Bn.	e−4·5, f+1	7·6	
„ 8	65	t.22	„	Ni.	f−3, h+1·5	8·0	
„ 15	72	t.30	2	Bn.	f−1·5, g+3	7·9	
„ 16	73	45	1	Br.	f+1	7·6	
„ 21	78	t.22	„	Ni.	=f	7·7	
„ 24	81	t.30	„	Bn.	e−4, f+1	7·6	
„ 28	85	45	„	Br.	d−4, e+1	7·1	
„ 28	85	t.22	„	Ni.	e−3, f+3	7·4	
„ 29	86	t.30	„	Bn.	e−3·5, f+2	7·5	
June 4	92	t.22	„	Ni.	e−4, f+2	7·5	
„ 7	95	10	„	Cr.	e−3, h+6	7·5	
„ 8	9196	t.30	„	Bn.	d−3·5, e+1	7·0	
„ 17	9205	t.22	„	Ni.	e−3, f+3	7·4	
„ 18	06	45	„	Br.	d+1	6·6	
July 3	21	t.22	„	Ni.	e−3, f+3	7·4	
„ 5	23	t.30	„	Bn.	d−3, e+1·5	7·0	
„ 10	28	„	„	„	d−3, e+1·5	7·0	
„ 10	28	t.22	„	Ni.	e−1, f+4	7·3	
„ 11	29	10	„	Cr.	d−3, =e	7·1	
„ 18	36	t.30	„	Bn.	d−3, e+1·5	7·0	
„ 21	39	10	„	Cr.	=d	6·7	
„ 22	40	B.	„	Gi.	=e	7·1	
„ 22	40	t.22	„	Ni.	d−3·5, e+1	7·0	
„ 23	41	45	„	Br.	d+1	6·6	
„ 23	41	B.	„	Gi.	=e	7·1	
„ 25	43	„	2	„	d−2, e+1	7·0	Difficult.
„ 27	45	t.30	1	Bn.	d−1, e+3·5	6·8	
„ 28	46	B.	„	Gi.	=e	7·1	
Aug. 1	50	„	2	„	=d	6·7	
„ 3	52	45	1	Br.	d+2	6·5	
„ 4	53	t.22	„	Ni.	d+1	6·6	
„ 5	54	50	„	Gi.	d+2	6·5	
„ 6	55	B.	„	Ni.	d−2, e+2	6·9	
„ 16	65	„	2	Gi.	d+3	6·4	
„ 17	66	„	1	„	b−3, d+5	6·0	
„ 20	69	„	„	„	b−6·5, d+4	6·2	
„ 23	9272	„	„	„	b−7, d+5	6·2	

(7609) T CEPHEI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
Aug. 23	9272	B.	1	Ni.	c−2, d+4·5	6·2	
,, 25	74	45	,,	Br.	d+9	5·8	Very bright.
,, 25	74	B.	,,	Gi.	b−2·5, c+2	5·8	
,, 27	76	,,	,,	,,	c+2	5·8	
,, 27	76	,,	,,	Ni.	c−2, d+4	6·3	
Sept. 3	83	,,	,,	Gi.	b−1·5, c+2	5·8	
,, 5	85	,,	,,	,,	b−2, c+2	5·8	
,, 6	86	60	2	Br.	d+12	5·5	Very bright.
,, 7	87	B.	,,	Gi.	b−1, c+2	5·7	
,, 10	90	,,	1	Br.	b−3, c+2	5·8	
,, 11	91	,,	2	Gi.	b−3, c+2	5·8	Difficult.
,, 13	93	,,	1	,,	b−2, c+2	5·8	
,, 18	9298	,,	,,	,,	=c	6·0	
,, 21	9301	,,	,,	Ni.	c−3·5, d+3	6·4	
,, 24	04	60	,,	Br.	d+9	5·8	
,, 24	04	B.	,,	Gi.	c−2, d+3·5	6·3	
,, 27	07	,,	,,	Ni.	c−4, d+2·5	6·4	
Oct. 10	20	45	,,	Br.	d+5	6·2	
,, 11	21	B.	,,	Ni.	=d	6·7	
,, 20	30	,,	,,	,,	e−5, f+1	7·6	
,, 26	36	,,	,,	,,	=e	7·1	
,, 26	36	t.30	,,	Bn.	d−1, e+3·5	6·8	
,, 27	37	60	,,	Br.	d+2	6·5	
,, 31	41	t.30	,,	Bn.	=e	7·1	
Nov. 2	43	40	2	Gi.	d−1, e+2	6·9	
,, 4	45	,,	1	,,	d−1, e+2	6·9	
,, 9	50	,,	,,	,,	d−2, e+1	7·0	
,, 9	50	t.22	,,	Ni.	e−2, f+4	7·3	
,, 14	55	40	,,	Gi.	=e, f+2·5	7·3	
,, 17	58	45	,,	Br.	d−6, f+4	7·3	
,, 22	63	t.22	,,	Ni.	h 4, k+3	8·5	
,, 26	67	40	,,	Gi.	f−2, g+2	7·9	
,, 30	71	,,	,,	,,	f−2, g+2	7·9	
Dec. 3	74	,,	,,	,,	f−2, h−1, g+1	8·1	
,, 4	75	45	,,	Br.	f−3, g+2	8·0	
,, 9	80	t.22	,,	Ni.	k−1, l+3	8·9	
,, 10	81	40	,,	Gi.	h−2, g+1	8·2	
,, 17	88	,,	,,	,,	g−3, k+2, l+3	8·6	
,, 17	88	45	,,	Br.	l+2	9·0	
,, 17	88	t.22	,,	Ni.	=l	9·2	
,, 24	95	40	2	Gi.	g−3, l+1	8·8	
,, 25	96	,,	1	,,	=k	8·8	
,, 27	9398	t.22	,,	Ni.	l−2, m+2	9·4	
,, 31	9402	40	,,	Gi.	k−1, l+2	8·9	
1912.							
Jan. 7	09	160	,,	Br.	m−2, n+2	9·9	
,, 7	09	t.22	,,	Ni.	m−1, n+3	9·8	
,, 8	10	40	,,	Gi.	l−2, m+4	9·3	
,, 12	14	,,	,,	,,	l−4, m+2·5	9·5	
,, 23	9425	160	,,	Br.	m−2, n+2	9·9	

(7609) T CEPHEI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Jan. 26	9428	T.50	1	Bn.	m−1, n+2	9·8	
,, 26	28	t.22	,,	Ni.	m−3·5, n+1	10·0	
Feb. 7	40	,,	,,	,,	m−3, n−0·5	10·1	
,, 12	45	40	2	La.	=o	10·5	
,, 17	50	,,	,,	,,	=o	10·5	
,, 20	53	,,	1	,,	o−1, p+4	10·6	
,, 21	54	t.22	,,	Ni.	n−1·5	10·3	
,, 22	55	40	,,	La.	o−4, p+2	10·9	
,, 22	55	160	,,	Br.	n−2	10·3	
,, 27	60	40	,,	La.	o−4, p+2	10·9	
Mar. 6	68	160	,,	Br.	n−2, o+2	10·3	
,, 6	68	t.22	2	Ni.	n−1	10·2	In T.94, 9·9.
,, 8	70	40	1	La.	o−1, p+4	10·6	
,, 10	72	,,	2	,,	=o	10·5	
,, 13	75	,,	1	,,	=o	10·5	
,, 13	75	,,	,,	Gi.	n−2, o+1	10·4	
,, 15	77	,,	,,	,,	m−3, n+2	9·9	
,, 15	77	,,	,,	La.	=o	10·5	
,, 19	81	,,	2	,,	n−2, o+1	10·4	
,, 19	81	,,	1	Gi.	m−3, n+2	9·9	
,, 19	81	t.22	,,	Ni.	=n	10·1	
,, 20	82	160	,,	Br.	=m	9·7	
,, 21	83	40	,,	La.	n−1, o+2·5	10·2	
,, 23	85	,,	,,	Gi.	m−2, n+1	9·9	
,, 25	87	,,	,,	La.	m−1, n+3	9·8	
,, 30	92	,,	2	,,	m−1·5, n+3	9·8	
Apr. 3	96	T.50	,,	Bn.	l−4, m+1	9·6	
,, 3	96	t.22	1	Ni.	l−4, m+1	9·6	
,, 4	97	40	,,	Gi.	l−3, m+2	9·5	
,, 6	9499	,,	,,	La.	l−3, m+1	9·5	
,, 7	9500	,,	,,	,,	=m	9·7	
,, 8	01	,,	,,	,,	m−1, n+3	9·8	
,, 8	01	,,	,,	Gi.	=l	9·2	
,, 11	04	,,	,,	La.	=m	9·7	
,, 11	04	t.22	,,	Ni.	=l	9·2	
,, 14	07	160	,,	Br.	=l, m+5	9·2	
,, 20	13	40	,,	La.	k−3, l+1	9·1	
,, 20	13	t.22	,,	Ni.	k−2, l+2	9·0	
,, 22	15	40	,,	Gi.	h−6, k+2	8·7	
,, 23	16	20	,,	La.	k−2, l+1	9·0	
,, 24	17	40	,,	,,	k−2, l+2	9·0	
,, 26	19	t.22	,,	Ni.	=k	8·8	
,, 29	22	t.30	,,	Bn.	f−4, g+1	8·1	
May 4	27	40	,,	La.	=k	8·8	
,, 6	29	,,	,,	,,	=k	8·8	
,, 9	32	,,	,,	Gi.	h−4, g+1	8·3	
,, 10	33	,,	,,	La.	=k	8·8	
,, 10	33	t.22	,,	Ni.	=k	8·8	
,, 11	34	40	,,	Gi.	h−3, g+1	8·3	
,, 17	40	t.22	,,	Ni.	h−5, k+1	8·7	
,, 18	41	40	,,	Gi.	h−3, g+2	8·2	
,, 18	9541	45	,,	Br.	g−5, l+5	8·7	

(7609) T CEPHEI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
May 25	9548	t.22	1	Ni.	h−4, k+2	8·6	
,, 27	50	40	,,	La.	h−3, k+4	8·4	
June 2	56	,,	,,	Gi.	h−2, g+4	8·1	
,, 2	56	,,	2	La.	h−4, k+2	8·6	
,, 3	57	T.50	1	Bn.	f−3, g+1·5	8·0	
,, 6	60	45	,,	Br.	f−1, g+3	7·8	
,, 6	60	20	2	La.	g−2, k+4	8·4	
,, 6	60	t.22	,,	Ni.	h−4, k+2·5	8·5	
,, 7	61	40	1	Gi.	h−1, g+2·5	8·1	
,, 10	64	t.30	,,	Bn.	f−3·5, g+1	8·1	
,, 11	65	40	,,	La.	g−1, k+5	8·3	
,, 15	69	,,	2	,,	g−1, k+5	8·3	
,, 17	71	,,	1	Gi.	f−2·5, h+2	7·9	
,, 18	72	t.22	,,	Ni.	h−1·5, k+5	8·3	Yellowish orange.
,, 21	75	t.30	,,	Bn.	f−3·5, g+1	8·1	
,, 22	76	20	,,	La.	g−1·5, k+5	8·3	
,, 27	81	40	,,	Gi.	f−2, h+2	7·9	
July 3	87	20	,,	La.	=g	8·2	
,, 5	89	40	,,	Gi.	f−1, h+2	7·9	
,, 5	89	t.22	,,	Ni.	h−4, k+3	8·5	
,, 10	94	,,	2	,,	h−2·5, k+4	8·4	
,, 12	96	40	1	Gi.	f−2, h+2	7·9	
,, 13	97	T.50	,,	Bn.	f−3, g+2	8·0	
,, 15	9599	20	,,	La.	h+1	8·0	
,, 16	9600	T.50	,,	Bn.	f−2, g+3·5	7·9	
,, 22	06	20	2	La.	=h	8·1	
,, 23	07	40	,,	Gi.	f−2, h+4	7·8	
,, 24	08	t.22	1	Ni.	=h	8·1	
,, 28	12	,,	,,	,,	f−3, h+2	8·0	
,, 31	15	40	,,	La.	f−3, h+1	8·0	
Aug. 1	16	,,	,,	Gi.	f−2, h+3	7·9	
,, 2	17	45	,,	Br.	f−1, g+3	7·8	
,, 2	17	t.22	,,	Ni.	f−3·5, h+1	8·0	
,, 9	24	20	,,	La.	f−1·5, h+3	7·8	
,, 9	24	t.22	2	Ni.	f−1·5, h+3	7·8	
,, 10	25	40	1	Gi.	e−3, f+3	7·4	
,, 14	29	,,	,,	,,	e−2, f+4	7·3	
,, 16	31	,,	,,	La.	f−1·5, g+3	7·9	
,, 18	33	,,	,,	Gi.	e−1, f+4	7·3	
,, 18	33	t.22	,,	Ni.	e−4, f+1·5	7·5	
,, 23	38	40	,,	Gi.	d−2, e+3	6·9	
,, 24	39	20	,,	La.	=d	6·7	
,, 26	41	,,	,,	,,	=d	6·7	
,, 28	43	,,	,,	,,	c−5, d+1	6·6	
,, 28	43	B.	2	Gi.	c−6, d+2	6·6	
,, 30	45	20	1	La.	c−4, d+2·5	6·4	
,, 30	45	B.	,,	Bn.	c−5, d+1	6·6	In t.30, 6·5.
,, 31	46	,,	,,	Gi.	c−5, d+2	6·5	
Sept. 1	47	20	,,	La.	c−3, d+3	6·4	
,, 2	48	45	,,	Br.	d+2	6·5-	
,, 3	9649	20	,,	La.	c−4, d+2	6·5	

(7609) T CEPHEI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912. Sept. 4	9650	t.22	1	Ni.	d+5	6·2	Yellowish orange. In B. 6·6.
,, 6	52	B.	,,	Th.	c−6, d+1	6·6	Ruddy.
,, 7	53	,,	2	Gi.	c−3, d+4	6·3	Difficult.
,, 7	53	20	1	La.	=c	6·0	In B. 6·5. Red.
,, 11	57	B.	,,	Ni.	d+2	6·5	
,, 12	58	,,	2	Th.	c−5, d+1·5	6·5	
,, 13	59	20	,,	La.	=c	6·0	
,, 14	60	B.	1	Gi.	c−1	6·1	
,, 14	60	,,	,,	Ni.	d+2·5	6·4	
,, 16	62	,,	,,	Gi.	c−1	6·1	
,, 16	62	20	,,	La.	b−3, c+2	5·8	
,, 18	64	45	,,	Br.	d+7	6·0	Very orange.
,, 18	64	B.	2	Th.	c−3, d+3	6·4	
,, 18	64	20	1	La.	=c	6·0	
,, 20	66	B.	2	Th.	c−3, d+3	6·4	
,, 21	67	,,	1	Bn.	c−1·5, d+5	6·2	
,, 21	67	,,	,,	Gi.	b−3, =c	5·9	
,, 21	67	,,	,,	Ni.	c−3, d+4	6·3	
,, 22	68	45	,,	Br.	d+8	5·9	In B. 6·2.
,, 24	70	20	2	La.	c−2	6·2	
,, 25	71	B	,,	Ni.	c−1·5, d+5	6·2	
,, 27	73	,,	1	Th.	c−1·5, d+5	6·2	
,, 27	73	20	2	La.	c+1	5·9	
Oct. 1	77	B.	,,	Th.	c−1·5, d+5	6·2	
,, 2	78	,,	1	Bn.	c−2, d+4	6·3	
,, 2	78	,,	,,	Gi.	c−1, d+5	6·2	
,, 3	79	,,	,,	Ni.	c−3, d+3	6·4	
,, 4	80	,,	,,	Bn.	c−1·5, d+5	6·2	
,, 9	85	,,	2	Th.	c−2, d+4·5	6·2	
,, 9	85	,,	1	Ni.	c−4, d+2·5	6·4	
,, 10	86	45	,,	Br.	d+5	6·2	
,, 10	86	B.	,,	Bn.	c−5, d+1·5	6·5	
,, 10	86	,,	,,	Gi.	c−4, d+1·5	6·5	
,, 11	87	20	,,	La.	c−5, d+1·5	6·5	
,, 13	89	,,	,,	,,	=c	6·0	
,, 14	90	B.	,,	Bn.	c−5·5, d+1	6·6	
,, 14	90	,,	,,	Gi.	c−3, d+3	6·4	
,, 14	90	,,	,,	Th.	c−5, d+1·5	6·5	
,, 15	91	20	,,	La.	c−1·5, d+5	6·2	
,, 17	93	B.	,,	Br.	d+4	6·3	
,, 17	93	20	,,	La.	c−1·5, d+5	6·2	
,, 17	93	B.	,,	Ni.	c−5·5, d+1	6·6	
,, 20	96	,,	,,	Th.	c−5, d+1	6·6	
,, 20	9696	20	,,	La.	c−2·5, d+4	6·3	
,, 26	9702	,,	,,	,,	c−3, d+3	6·4	
,, 27	03	B.	,,	Th.	=d	6·7	
,, 29	05	45	,,	Br.	d+5	6·2	
Nov. 1	08	40	,,	Gi.	d+2	6·5	
,, 1	08	B.	,,	Th.	d−2, e+2	6·9	
,, 3	10	,,	,,	Ni.	d−1·5, e+3	6·8	
,, 7	14	20	,,	La.	d+1·5	6·5	
,, 9	16	,,	,,	,,	=d	6·7	
,, 11	9718	45	,,	Br.	d+2	6·5	

(7609) T CEPHEI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Nov. 12	9719	20	1	La.	d - 1	6·8	
,, 24	31	40	2	Gi.	d − 2, e + 2	6·9	
,, 25	32	20	,,	La.	d − 3, f + 3	7·2	About.
,, 28	35	t.22	,,	Ni.	e − 2, f + 4	7·3	
,, 30	37	T.50	1	Bn.	d − 3, e + 1·5	7·0	Very red.
Dec. 3	40	40	,,	Gi.	e − 2, f + 3	7·4	
,, 3	40	20	,,	La.	= h	8·1	
,, 4	41	45	,,	Br.	f + 1	7·6	
,, 5	42	20	,,	La.	e − 7, h + 2	7·9	
,, 5	42	t.22	,,	Ni.	f − 3, h + 1	8·0	
,, 7	44	40	,,	Gi.	e − 3, f + 2	7·5	
,, 9	46	20	,,	La.	e − 7, h + 2	7·9	
,, 12	49	t.30	,,	Bn.	e − 4·5, f + 1	7·6	
,, 12	49	t.22	,,	Ni.	f − 4, h + 0·5	8·1	
,, 15	52	20	,,	La.	h − 1·5, k + 5	8·3	
,, 18	55	T.25	,,	Bn.	e − 4·5, f + 1	7·6	
,, 18	55	60	2	Th.	= g	8·2	Very red.
,, 20	57	40	1	Gi.	f − 3, h + 1	8·0	
,, 23	60	45	,,	Br.	f + 1	7·6	
,, 25	62	t.22	,,	Ni.	h − 2, k + 4	8·4	
,, 29	66	T.50	,,	Bn.	f − 3·5, g + 1	8·1	
,, 29	66	60	,,	Th.	= g	8·2	
,, 31	68	40	,,	Gi.	h − 2, = g	8·3	
1913.							
Jan. 2	70	45	,,	Br.	f − 3, g + 2	8·0	
,, 5	73	T.50	,,	Bn.	f − 4, g + 1	8·1	
,, 5	73	50	,,	Ma.	h − 1	8·2	Pale red.
,, 5	73	60	,,	Th.	g − 4	8·6	
,, 6	74	40	2	La.	= k	8·8	
,, 8	76	,,	,,	Gi.	g − 2, k + 3	8·4	
,, 8	76	t.22	1	Ni.	= k	8·8	
,, 9	77	50	,,	Ma.	h − 8, l + 2	9·0	Red.
,, 12	80	t.30	,,	Bn.	k − 7, m + 2	9·5	
,, 12	80	40	,,	La.	= l	9·2	
,, 15	83	t.22	,,	Ni.	= l	9·2	
,, 24	92	40	2	La.	l − 1·5, m + 3	9·3	
,, 25	93	50	1	Ma.	l − 1, 21 + 6	9·3	Pale red.
,, 25	93	62	2	Th.	= l	9·2	Very red.
,, 26	94	45	1	Br.	g − 5, l + 5	8·7	
,, 26	94	T.95	,,	Bn.	l − 1, m + 3·5	9·3	
,, 31	9799	t.22	,,	Ni.	l − 3, m + 1	9·5	
Feb. 3	9802	40	2	Gi.	l − 3, m + 3	9·4	
,, 8	07	50	1	Ma.	l − 5, 21 + 3	9·7	
,, 8	07	120	2	Th.	= m	9·7	
,, 9	08	40	1	La.	= m	9·7	
,, 15	14	,,	2	Gi.	= m	9·7	
,, 15	14	,,	,,	La.	= m	9·7	
,, 15	14	t.22	1	Ni.	m − 2, n + 3	9·8	
,, 24	23	,,	,,	,,	m − 3, n + 1·5	10·0	
,, 25	24	45	,,	Br.	m − 1, n + 3	9·8	
,, 25	24	40	,,	La.	m − 3, n + 1	10·0	
,, 27	9826	37	,,	Th.	= n	10·1	

(7609) T CEPHEI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Mar. 1	9828	40	1	La.	=m	9·7	
„ 3	30	„	2	Gi.	m−2, n+2	9·9	
„ 5	32	„	„	La.	m−2, n+2	9·9	
„ 8	35	t.22	1	Ni.	m−3, n+0·5	10·0	
„ 11	38	160	„	Br.	m−3, n+1	10·0	
„ 11	38	120	„	Th.	=n	10·1	
„ 14	41	„	2	„	m−2, n+2	9·9	
„ 25	52	t.22	1	Ni.	=n	10·1	
„ 28	55	T.50	„	Bn.	m−2·5, n+2	9·9	
„ 30	57	45	„	Br.	m+1	9·6	
Apr. 4	62	62	„	Th.	=m	9·7	
„ 15	73	40	„	La.	=m, n+5	9·6	
„ 16	74	62	„	Th.	l−2, m+2	9·4	
„ 19	77	„	„	„	l+1	9·1	
„ 22	80	t.22	„	Ni.	=l	9·2	
„ 27	85	45	„	Br.	l+2	9·0	
„ 28	86	40	„	La.	l−3, m+1	9·5	
„ 28	86	62	„	Th.	l−2, m+2	9·4	Very red.
„ 28	86	t·22	„	Ni.	=l	9·2	
„ 30	88	20	„	La.	k−3, l+1	9·1	
May 1	89	62	2	Th.	=l	9·2	
„ 6	94	T.50	1	Bn.	g−4, k+1	8·6	
„ 6	94	40	„	La.	k−2, l+1	9·0	
„ 7	95	25	„	Bo.	k−1·5, 15+3	8·9	
„ 9	97	45	„	Br.	=g	8·2	
„ 9	97	40	„	La.	k−2, l+1	9·0	
„ 10	98	25	„	Bo.	k−2, l+2	9·0	
„ 10	98	T.50	„	Bn.	g−4, k+2	8·6	
„ 11	9899	t.22	„	Ni.	k−0·5, l+3	8·9	
„ 12	9900	40	„	Gi.	g−1, k+3	8·4	
„ 15	03	t.22	„	Ni.	=k	8·8	
„ 16	04	T.50	„	Bn.	g−4, k+2	8·6	
„ 18	06	40	„	Gi.	=g, k+3	8·3	
„ 20	08	„	„	La.	h−6, k+1	8·7	
„ 21	09	25	„	Bo.	=k	8·8	
„ 22	10	20	„	La.	h−6, =k	8·8	
„ 24	12	25	„	Bo.	g−1, k+4·5	8·3	
„ 24	12	37	„	Th.	=h, g+1	8·1	
„ 25	13	45	„	Br.	=f	7·7	
„ 25	13	T.50	„	Bn.	f−3·5, g+1	8·1	
„ 25	13	34	„	Cr.	h−3	8·4	
„ 26	14	25	„	Bo.	f−3·5, g+1	8·1	
„ 26	14	t.22	„	Ni.	h−6, k+1	8·7	
„ 27	15	40	2	La.	h−3, k+3	8·5	
„ 28	16	25	1	Bo.	=g	8·2	
„ 29	17	40	„	Gi.	h−2, g+1	8·2	
„ 30	18	T.50	„	Bn.	g−2, k+4	8·4	
„ 30	18	40	„	La.	h−4, k+2	8·6	
„ 30	18	62	„	Th.	f−1, g+3	7·8	
„ 31	19	34	2	Cr.	h+1	8·0	
June 2	21	25	1	Bo.	f−3·5, g+1	8·1	
„ 2	21	50	2	Ma.	h−2, l+8·5	8·3	
„ 3	9922	34	„	Cr.	f−1, g+3	7·8	

(7609) T CEPHEI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
June 4	9923	T.50	1	Bn.	f−3·5, g+1	8·1	
„ 7	26	34	2	Cr.	f−1, h+3	7·8	
„ 7	26	t.22	1	Ni.	h−5, k+2	8·6	
„ 8	27	40	„	Gi.	f−2, h+1	8·0	
„ 8	27	„	2	La.	h−3, k+3	8·5	
„ 12	31	20	1	„	f−2, h+2	7·9	
„ 14	33	25	„	Bo.	f−3·5, g+1	8·1	
„ 14	33	t.22	„	Ni.	=h	8·1	
„ 17	36	34	„	Cr.	=f	7·7	
„ 19	38	25	„	Bo.	e−4, f+1	7·6	
„ 23	42	20	„	La.	f−1, h+3	7·8	Orange red.
„ 29	48	T.25	„	Bn.	d−2·5, e+2	6·9	
„ 30	49	25	„	Bo.	d−2, e+2	6·9	
July 9	58	37	2	Th.	=e	7·1	
„ 10	59	t.22	1	Ni.	=f	7·7	
„ 12	61	20	2	La.	=e	7·1	Red.
„ 20	69	T.25	1	Bn.	d−1·5, e+3	6·8	
„ 24	73	15	2	Bo.	=d	6·7	
„ 26	75	20	„	La.	=d	6·7	Red.
„ 28	77	15	1	Bo.	d−1, e+3	6·8	
„ 28	77	37	2	Th.	e−1	7·2	
„ 29	78	T.25	1	Bn.	d−1, e+3·5	6·8	
„ 31	80	15	„	Bo.	e−3, f+3	7·4	
Aug. 1	81	45	„	Br.	=d	6·7	
„ 4	84	37	„	Th.	d−2·5, e+2	6·9	In F. 7·6.
„ 12	92	15	2	Bo.	e−4, f+1	7·6	
„ 12	92	t.22	1	Ni.	=e	7·1	
„ 17	9997	15	2	Bo.	d−1, e+3	6·8	
„ 20	0000	„	1	„	d−3, e+1	7·0	
„ 22	02	t.22	„	Ni.	e−3, f+3	7·4	
„ 23	03	15	„	Bo.	d−1, e+3	6·8	
„ 24	04	45	„	Br.	=d	6·7	
„ 27	07	37	2	Th.	d−1, e+3	6·8	
„ 27	07	15	1	Bo.	d−1, e+3	6·8	
„ 28	08	20	„	La.	c−5, d+1·5	6·5	Orange red.
Sept. 6	17	t.22	„	Ni.	=d	6·7	
„ 7	18	45	„	Br.	d+2	6·5	
„ 7	18	37	„	Th.	d−1	6·8	In F. 7·8.
„ 7	18	T.25	„	Bn.	d+2	6·5	Very red.
„ 8	19	25	2	Bo.	b−9, d+2	6·5	
„ 11	22	15	1	„	b−10, d+1	6·6	
„ 11	22	B.	2	Th.	d−1	6·8	
„ 12	23	t.22	1	Ni.	d+2	6·5	
„ 15	26	37	2	Th.	d+3	6·4	
„ 20	31	B.	„	Bo.	b−9, d+3	6·4	
„ 20	31	50	„	Ma.	d+2·5	6·4	
„ 24	35	B.	1	Bo.	c−2, d+4	6·3	
„ 24	35	45	„	Br.	d+10	5·7	
„ 24	35	B.	„	Bn.	c−2, d+4	6·3	
„ 24	35	20	„	La.	b−2, c+2	5·8	Orange. In B. 6·1.
„ 24	35	50	„	Ma.	d+6	6·1	Very red.
„ 26	37	B.	„	Ni.	c−3·5, d+3	6·4	
„ 27	0038	„	„	Bo.	c−1·5, d+5	6·2	

(7609) T CEPHEI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Sept. 28	0039	B.	1	Th.	c−1·5, d+5	6·2	
,, 28	39	,,	,,	Ni.	c−3, d+3·5	6·3	
,, 30	41	,,	2	Bo.	c−1·5, d+5	6·2	
Oct. 4	45	,,	,,	,,	c−0·5, d+6	6·1	
,, 6	47	,,	1	Bu.	b−3, c+1	5·9	
,, 9	50	20	,,	La.	a−4, b+2	5·3	Orange red.
,, 9	50	F.	2	Th.	b−3, d+9	5·8	
,, 9	50	B.	1	Ni.	c−0·5	6·1	
,, 12	53	,,	,,	Bo.	=c	6·0	
,, 17	58	45	2	Br.	d+15	5·2	About. Vis: to N.E.
,, 17	58	B.	1	Ni.	=c	6·0	
,, 19	60	20	,,	La.	a−4, b+2	5·3	Yellow.
,, 22	63	37	2	Th.	d+7	6·0	In B. 6·0.
,, 22	63	50	1	Ma.	d+6·5	6·0	Very red.
,, 23	64	,,	,,	,,	d+6·5	6·0	
,, 23	64	B.	2	Bh.	b+3	5·2	
,, 24	65	,,	,,	Bo.	c−1·5, d+5	6·2	
,, 24	65	45	1	Br.	d+12	5·5	In B. 5·9. Vis: to N.E.
,, 24	65	B.	2	Bh.	b+2	5·3	
,, 25	66	20	,,	La.	=b, c+5	5·5	Orange red.
,, 25	66	B.	1	Ni.	c−2·5, d+4	6·3	
,, 28	69	,,	2	Bh.	=b, c+5	5·5	
,, 29	70	,,	,,	Br.	=c	6·0	
,, 31	72	20	,,	La.	a−5, b+3	5·3	
,, 31	72	B.	,,	Th.	c−3	6·3	
Nov. 1	73	,,	,,	Bo.	c−3, d+3	6·4	
,, 1	73	45	1	Br.	d+9	5·8	In B. 6·1. Vis: to N.E.
,, 1	73	B.	2	Th.	c−3	6·3	
,, 1	73	,,	,,	Bh.	=b	5·5	
,, 3	75	,,	1	Th.	c−1·5, d+5	6·2	
,, 3	75	,,	,,	Ni.	c−3, d+4	6·3	
,, 5	77	,,	,,	Bn.	c−4·5, d+2	6·5	
,, 6	78	,,	,,	Th.	c−1·5, d+5	6·2	
,, 7	79	62	2	,,	d+10	5·7	About.
,, 8	80	45	,,	Bh.	d+10	5·7	
,, 12	84	B.	,,	Th.	c−2, d+4·5	6·2	
,, 16	88	45	,,	Bh.	b−4, d+8	5·9	
,, 17	89	20	1	La.	c−2	6·2	
,, 18	90	50	2	Ma.	d+3	6·4	Red.
,, 18	90	B.	1	Th.	c−4, d+2·5	6·4	
,, 18	90	,,	,,	Ni.	c−6, d+1	6·6	
,, 19	91	,,	2	Bo.	c−5, d+1·5	6·5	
,, 22	94	45	1	Br.	d+6	6·1	In B. 6·5.
,, 22	94	,,	,,	Bh.	d+8	5·9	
,, 22	94	37	2	Th.	d+4	6·3	
,, 25	0097	B.	1	Ni.	c−6, d+0·5	6·6	
,, 28	0100	45	2	Bh.	=c	6·0	In B. 6·0.
,, 29	01	20	1	La.	c−4, d+2·5	6·4	
,, 29	0101	B.	2	Th.	d+1	6·6	

(7609) T CEPHEI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Dec. 4	0106	45	1	Br.	d+3	6·4	
,, 4	06	,,	2	Bh.	=c	6·0	In B. 6·0.
,, 5	07	20	,,	La.	c−4, d+2	6·5	Very orange.
,, 6	08	t.22	1	Ni.	d+2·5	6·4	In B. 6·9.
,, 9	11	45	2	Bh.	b−6, =c, d+6	6·1	
,, 9	11	62	1	Th.	d+1	6·6	In F. 6·9.
,, 10	12	40	,,	La.	c−5, d+1·5	6·5	
,, 15	17	,,	,,	,,	c−5, d+1·5	6·5	
,, 16	18	45	2	Bh.	d+5	6·2	
,, 16	18	62	1	Th.	d−1	6·8	
,, 17	19	25	2	Bo.	=d	6·7	
,, 18	20	T.25	1	Bn.	d−1, e+3·5	6·8	
,, 18	20	50	,,	Ma.	d−1	6·8	Red.
,, 18	20	t.22	,,	Ni.	d−1, e+3·5	6·8	In B. 7·2.
,, 20	22	62	2	Th.	=d	6·7	
,, 21	23	45	,,	Bh.	d+3	6·4	
,, 21	23	20	,,	La.	c−5, d+1·5	6·5	Orange.
,, 24	26	45	1	Br.	d+1	6·6	
,, 24	26	90	,,	Bh.	=d	6·7	
,, 27	29	20	,,	La.	=d, e+4	6·7	
,, 28	30	T.25	,,	Bn.	d−3, e+1	7·0	
,, 28	30	60	2	Th.	d−3	7·0	
,, 30	32	90	1	Bh.	e−3, f+2	7·5	
,, 31	33	25	2	Bo.	e−3, f+3	7·4	
,, 31	33	T.25	1	Bn.	d−3·5, e+1	7·0	
1914.							
Jan. 4	37	t.22	,,	Ni.	f−2, h+2	7·9	
,, 5	38	T.50	,,	Bn.	=e	7·1	
,, 6	39	45	,,	Br.	d−5, f+5	7·2	
,, 6	39	,,	2	Bh.	g+5	7·7	
,, 6	39	60	,,	Th.	d−2	6·9	
,, 11	44	24	,,	Bo.	e−1, f+4	7·3	
,, 11	44	79	1	Ma.	h+2·5	7·9	
,, 14	47	t.22	,,	Ni.	=f, h+3	7·8	
,, 14	47	24	,,	Bo.	f−2, g+2	7·9	
,, 15	48	20	,,	La.	f−4, h−1, =g, k+5	8·2	
,, 18	51	24	2	Bo.	f−3, g+2	8·0	
,, 22	55	,,	,,	,,	f−4, g+1	8·1	
,, 23	56	45	1	Br.	f+2	7·5	
,, 23	56	60	2	Th.	g+2	8·0	
,, 25	58	20	,,	La.	g−2, k+4	8·4	
,, 26	59	T.50	1	Bn.	f−3·5, g+1	8·1	
,, 26	59	45	,,	Bh.	=g	8·2	
Feb. 1	65	60	,,	Th.	f+1	7·6	
,, 1	65	t.22	,,	Ni.	k−1·5, l+3	8·9	
,, 2	66	40	,,	Bc.	g−3, k+3	8·5	
,, 3	67	,,	,,	La.	=k, l+3	8·8	
,, 3	67	50	,,	Ma.	h−8, l+3	8·9	
,, 3	67	24	,,	Bo.	f−4, g+1	8·1	
,, 4	68	T.50	,,	Bn.	g−3, k+2	8·5	
,, 5	69	40	,,	La.	=k, l+4	8·8	
,, 5	0169	90	,,	Bh.	g−7, 15+3·5	8·9	

(7609) T CEPHEI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Feb. 10	0174	24	1	Bo.	g−3, k+3	8·5	
,, 10	74	60	2	Th.	g−2	8·4	
,, 12	76	40	1	Be.	k+1, l+5	8·7	
,, 12	76	t.22	2	Ni.	k−1·5, l+2	9·0	
,, 14	78	40	1	Be.	=k, l+4	8·8	
,, 16	80	,,	2	Th.	h−5, =k, l+5	8·7	
,, 17	81	24	1	Bo.	g−4, k+1	8·6	
,, 17	81	40	,,	La.	k−4, =l, m+4	9·2	
,, 18	82	45	,,	Br.	g−5, l+5	8·7	
,, 18	82	T.50	,,	Bn.	k−3, l+1	9·1	
,, 23	87	24	,,	Bo.	k−4, m+4	9·2	
,, 23	87	45	,,	Bh.	g−7, l+2	8·9	
,, 26	90	T.50	,,	Bn.	k−3, l+0·5	9·1	
,, 28	92	24	2	Bo.	k−6·5, m+2	9·4	
Mar. 1	93	45	1	Br.	=l	9·2	
,, 1	93	t.22	,,	Ni.	l−3, m+1	9·5	
,, 7	0199	90	..	Bh.	=l	9·2	
,, 13	0205	75	,,	La.	m−1, n+4	9·7	
,, 16	08	45	,,	Br.	l−1, m+3	9·3	
,, 16	08	90	,,	Bh.	l−2, m+2	9·4	
,, 16	08	t.22	,,	Ni.	m−3, n+1·5	10·0	
,, 22	14	T.50	,,	Bn.	m−3, n+1·5	10·0	
,, 25	17	90	,,	Bh.	m−3, n+1·5	10·0	
,, 28	20	70	2	Bo.	n−2, o+2	10·3	
,, 28	20	t.22	1	Ni.	m−4, n+1	10·0	
,, 31	23	40	,,	La.	m−3, n+1	10·0	
Apr. 1	24	90	,,	Bh.	m−5, n−1, o+3	10·2	
,, 2	25	40	,,	La.	m−4, n+1	10·0	
,, 10	33	,,	,,	,,	m−3, n+1	10·0	
,, 10	33	90	2	Bh.	n−1, o+1	10·3	
,, 12	35	,,	1	,,	n−1, =24, =26	10·2	
,, 12	35	t.22	,,	Ni.	m−4, n+1	10·0	
,, 13	36	40	,,	Be.	m−4, n+1	10·0	
,, 13	36	,,	,,	La.	m−3, n+1	10·0	
,, 14	37	24	2	Bo.	n−2, o+2	10·3	
,, 16	39	40	1	La.	m−3, n+1	10·0	
,, 18	41	45	,,	Br.	m−2, n+4	9·8	
,, 18	41	90	,,	Bh.	n−1	10·2	
,, 20	43	t.22	,,	Ni.	m−4, n+0·5	10·1	
,, 21	44	40	,,	Be.	n−1	10·2	
,, 22	45	90	,,	Bh.	n−1, =24, =25	10·2	
,, 23	46	40	2	La.	m−4, n+1	10·0	
,, 25	48	,,	1	Be.	n−3	10·4	
,, 26	49	150	,,	Bh.	m−3·5, n+1	10·0	
,, 26	49	t.22	,,	Ni.	=n	10·1	
,, 27	50	T.50	,,	Bn.	m−2·5, n+2	9·9	
,, 27	50	34	,,	Cr.	m−2, n+2	9·9	
,, 30	53	90	,,	Bh.	m−2, n+2	9·9	
,, 30	53	40	,,	La.	m−3, n+1	10·0	
May 2	55	24	2	Bo.	m−1, n+3	9·8	
,, 6	59	40	1	La.	m−3, n+1	10·0	
,, 10	63	45	,,	Br.	=m	9·7	
,, 10	0263	90	,,	Bh.	m+1	9·6	

(7609) T CEPHEI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
May 13	0266	90	1	Bh.	l−2, m+2	9·4	
,, 15	68	t.22	,,	Ni.	=n	10·1	
,, 16	69	T.50	,,	Bn.	m−2, n+2	9·9	
,, 16	69	34	,,	Cr.	m+1	9·6	
,, 21	74	90	,,	Bh.	=l, =15	9·2	
,, 21	74	40	,,	La.	=m, n+5	9·6	
,, 26	79	T.50	,,	Bn.	=m, n+3	9·7	
,, 28	81	24	,,	Bo.	l−1·5, m+3	9·3	
,, 29	82	40	,,	La.	l−2, m+2	9·4	
,, 30	83	t.22	,,	Ni.	m−1, n+2	9·8	
June 2	86	24	2	Bo.	g−7, l+2	8·9	
,, 3	87	90	1	Bh.	g−7, l+2	8·9	
,, 6	90	t.22	,,	Ni.	k−4, m+4	9·2	
,, 10	94	45	,,	Br.	f−4, g+2	8·0	
,, 11	95	40	,,	La.	k−2, l+2, m+5	9·0	
,, 13	97	90	,,	Bh.	g−4, k+3	8·5	
,, 14	0298	40	2	Th.	h−5, l+5	8·7	
,, 17	0301	,,	1	La.	k−1·5, l+3	8·9	
,, 17	01	,,	2	Th.	g−2, h−3	8·4	
,, 18	02	24	,,	Bo.	=g	8·2	
,, 19	03	45	,,	Bh.	=g	8·2	
,, 21	05	,,	1	Br.	f−3, g+3	7·9	
,, 22	06	40	,,	La.	h−5, =k, l+5	8·7	
,, 22	06	60	,,	Th.	f−2, g+2	7·9	
,, 25	09	45	,,	Bh.	f−3, g+1·5	8·0	
,, 25	09	20	,,	La.	h−5, g−3, =k	8·6	
,, 25	09	40	,,	Th.	=f	7·7	
,, 26	10	24	,,	Bo.	f−4, g+1	8·1	
,, 29	13	45	,,	Br.	f−2, g+3	7·9	
,, 29	13	40	,,	Th.	=f	7·7	
,, 30	14	T.50	,,	Bn.	f−3·5, g+1	8·1	
,, 30	14	t.22	,,	Ni.	=k	8·8	
,, 30	14	50	,,	Ma.	h−4·5, l+6	8·6	Red.
July 3	17	40	,,	Be.	g−2, h−3	8·4	
,, 3	17	45	,,	Bh.	e−5, =f, g+5	7·7	
,, 3	17	40	,,	Th.	f−1	7·8	
,, 4	18	T.50	,,	Bn.	f−3·5, g+1	8·1	
,, 5	19	40	,,	La.	h−4, k+3	8·5	
,, 6	20	50	,,	Ma.	h−8, l+2	9·0	Ruddy.
,, 6	20	t.22	,,	Ni.	f−4, h+1	8·1	
,, 8	22	45	,,	Bh.	f+3	7·4	
,, 9	23	15	2	Bo.	f−1·5, g+3	7·9	
,, 9	23	T.25	1	Bn.	f−3·5, g+1	8·1	
,, 10	24	40	,,	Be.	f−3, h+1, g+2	8·0	
,, 10	24	t.22	,,	Ni.	f−3·5, h+1	8·0	
,, 16	30	20	,,	La.	d−4, e+2	7·0	Orange.
,, 17	31	40	,,	Be.	f+1	7·6	
,, 19	33	t.22	,,	Ni.	f−1·5, h+3	7·8	
,, 20	34	20	,,	La.	e−2, f+4	7·3	
,, 27	41	t.22	,,	Ni.	f−2, h+2	7·9	
,, 31	45	20	2	La.	e−2, f+4	7·3	
Aug. 3	48	45	1	Br.	d−3	7·0	
,, 4	0349	60	,,	Th.	d−1	6·8	

(7609) T CEPHEI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Aug. 7	0352	60	2	Th.	d+2	6·5	
,, 11	56	20	,,	La.	d−2, e+2	6·9	Very orange.
,, 11	56	t.22	,,	Ni.	=e	7·1	
,, 17	62	90	1	Bh.	d−2	6·9	
,, 17	62	60	,,	Th.	d+1	6·6	
,, 17	62	B.	,,	Ni.	e−5, f+0·5	7·6	
,, 18	63	t.22	2	,,	=e	7·1	
,, 21	66	45	1	Br.	d−3, f+6	7·0	
,, 23	68	20	,,	La.	d−2, e+2	6·9	Orange.
,, 25	70	60	,,	Th.	=d	6·7	
,, 26	71	T.50	,,	Bn.	d−3, e+1·5	7·0	
,, 26	71	45	,,	Bh.	d−1	6·8	
,, 27	72	60	,,	Th.	d−1	6·8	
,, 30	75	T.25	,,	Bn.	d−1, e+3·5	6·8	
,, 31	76	B.	,,	Ni.	=f, =h	7·9	
Sept. 2	78	40	,,	Bc.	f+5	7·2	
,, 3	79	20	,,	La.	e−1, f+4	7·3	
,, 4	80	90	,,	Bh.	=d	6·7	
,, 6	82	T.25	,,	Bn.	d−0·5, e+4	6·7	
,, 8	84	40	,,	Bc.	d−3	7·0	
,, 11	87	45	,,	Br.	d−2	6·9	
,, 11	87	B.	2	Ni.	=f	7·7	
,, 14	90	40	1	Bc.	d−1	6·8	
,, 14	90	B.	2	Th.	=h	8·1	
,, 17	93	20	1	La.	=d, e+2	6·8	
,, 20	96	T.25	,,	Bn.	d−1, e+3·5	6·8	
,, 20	96	40	,,	Bc.	d+1	6·6	
,, 20	96	45	,,	Bh.	=d	6·7	
,, 22	98	B.	,,	Ni.	=f	7·7	
,, 23	0399	45	,,	Br.	=d	6·7	
,, 24	0400	60	,,	Th.	d−3	7·0	
,, 27	03	45	,,	Bh.	d+3	6·4	
,, 29	05	,,	,,	,,	d+3	6·4	
,, 29	05	T.25	,,	Bn.	d	6·7	
,, 30	06	60	,,	Th.	=d	6·7	
,, 30	06	B.	,,	Ni.	e−3, f+2	7·5	
Oct. 4	10	40	,,	Bc.	d+1	6·6	
,, 7	13	20	,,	La.	c−4, d+3	6·4	Orange.
,, 10	16	45	,,	Bh.	d+4	6·3	In F. 6·4.
,, 11	17	B.	,,	Ni.	d−1·5, e+3	6·8	
,, 12	18	60	,,	Br.	d+4	6·3	
,, 18	24	45	,,	Bh.	d+5	6·2	
,, 20	26	40	,,	Bc.	d+3	6·4	
,, 23	29	60	2	Th.	d+5	6·2	
,, 27	33	90	1	Bh.	d+7	6·0	In F. 6·0.
Nov. 3	40	,,	,,	,,	d+10	5·7	In F. 6·4.
,, 7	44	45	,,	,,	d+8	5·9	
,, 7	44	40	,,	Th.	d+4	6·3	
,, 9	46	20	,,	La.	b−4, c+1	5·9	
,, 10	47	45	2	Br.	d+6	6·1	About.
,, 12	49	B.	1	Ni.	c−5, d+1	6·6	
,, 14	51	45	,,	Bh.	d+10	5·7	In F. 5·8.
,, 15	0452	,,	,,	,,	d+8	5·9	In F. 5·8.

(7609) T CEPHEI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Nov. 16	0453	B.	1	Ni.	c−6, d+1	6·6	
,, 17	54	20	2	La.	b−3, c+3	5·8	Orange red.
,, 17	54	60	1	Th.	d+4	6·3	
,, 18	55	T.50	,,	Bn.	d+3	6·4	
,, 20	57	45	,,	Bh.	d+6	6·1	
,, 22	59	,,	,,	,,	d+7	6·0	
,, 23	60	60	,,	Th.	d+6·5	6·0	
,, 27	64	,,	,,	Br.	d+8	5·9	
,, 27	64	45	,,	Bh.	=c, d+7	6·0	
,, 27	64	20	,,	La.	b−5, c−2, d+7	6·1	
,, 27	64	60	,,	Th.	d+4	6·3	
Dec. 3	70	B.	,,	Ni.	c−5, d+1	6·6	
,, 5	72	T.50	,,	Bn.	d+3	6·4	
,, 6	73	60	,,	Th.	d+4	6·3	
,, 7	74	B.	,,	,,	d+4	6·3	
,, 7	74	45	,,	Bh.	d+7	6·0	In F. 6·0.
,, 14	81	,,	,,	,,	d+3	6·4	
,, 14	81	B.	,,	Ni.	c−5·5, d+1	6·6	
,, 16	83	T.50	,,	Bn.	d+2	6·5	In B. 6·5.
,, 20	87	45	,,	Br.	d+5	6·2	
,, 20	87	,,	2	Bh.	d+2	6·5	
,, 20	87	60	1	Th.	d+1	6·6	
,, 20	87	B.	,,	Ni.	c−6, d+0·5	6·6	
,, 24	91	,,	,,	,,	=d	6·7	
,, 27	94	20	,,	La.	c−5, d+1	6·6	
,, 29	96	60	,,	Th.	=d	6·7	
,, 30	97	45	,,	Bh.	d+2	6·5	
,, 31	0498	,,	,,	Br.	d+3	6·4	

(8290) R PEGASI. (V. 1.)

H.D. 230110.

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Jan. 3	8675	t.85	2	Bn.	9−2·5, 13+5	10·4	
,, 10	82	t.75	1	,,	9−6, 13+2	10·7	
,, 26	8698	T.95	,,	,,	=13, 15+3	11·0	
,, 30	8702	,,	,,	,,	13−3, 15+1·5	11·2	
July 13	8866	66	2	F.G.B.	9−5, 13+2	10·6	
,, 22	75	,,	1	,,	9−2·5, 13+5	10·4	
,, 31	84	,,	,,	,,	9−1, 13+6	10·2	
,, 31	8884	50	,,	Ma.	9−2·5, 13+5	10·4	

(8290) R PEGASI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Aug. 2	8886	50	1	Ma.	9−1·5, 13+6	10·3	
,, 2	86	45	,,	F.G.B.	9−1, 13+6	10·2	
,, 6	90	,,	,,	,,	=9, 10+0·5	10·1	
,, 6	90	120	2	Gh.	=9	10·1	
,, 7	91	50	1	Ma.	9−1, 13+7	10·2	
,, 10	94	,,	,,	,,	9+3, 13+6	10·0	
,, 10	94	60	,,	Gh.	9−3, 13+4·5	10·4	
,, 11	8895	66	2	F.G.B.	=9	10·1	
,, 19	8903	50	,,	Ma.	3−15, 9+1	10·0	
,, 26	10	,,	1	,,	3−10, 9+6·5	9·4	
,, 26	10	45	,,	F.G.B.	4−4, 5+2	9·1	
Sept. 3	18	,,	,,	,,	=3	8·5	
,, 3	18	t.30	,,	Bn.	f−6, 3+1	8·3	
,, 3	18	60	2	Gh.	=3, =4	8·6	
,, 3	18	50	1	Ma.	=3	8·5	
,, 7	22	60	,,	Gh.	2−7, 3+4·5	8·0	
,, 9	24	45	,,	F.G.B.	2−8, 3+4	8·1	
,, 11	26	t.30	,,	Bn.	f−5·5, 3+2	8·3	
,, 12	27	,,	,,	,,	f−5, 3+2·5	8·2	
,, 12	27	45	,,	F.G.B.	2−6, 3+6	7·9	
,, 20	35	,,	,,	,,	2−2, 3+10	7·5	
,, 27	42	,,	,,	,,	=2	7·3	
,, 27	42	t.30	,,	Bn.	=1, =2	7·3	
,, 29	44	,,	,,	,,	1+1·5, 2+1	7·2	
Oct. 3	48	,,	,,	,,	1+2, 2+2	7·1	
,, 3	48	30	,,	Gh.	2−6, 3+6	7·9	
,, 6	51	t.30	,,	Bn.	2+2, 1+3	7·1	
,, 10	55	,,	2	,,	2+1·5, 1+2	7·2	
,, 10	55	45	1	F.G.B.	2+1	7·2	
,, 20	65	,,	,,	,,	=2	7·3	
,, 22	67	t.30	,,	Bn.	=2, 1+0·5	7·3	
,, 28	73	45	,,	F.G.B.	=2	7·3	
,, 28	73	30	,,	Gh.	1−5, 2−3, 3+7, 4+11	7·7	
,, 29	74	T.50	2	Bn.	2−1	7·4	
Nov. 1	77	t.30	,,	,,	=1, 2−2, 4+11	7·5	
,, 1	77	45	1	F.G.B.	2−2, 3+10	7·5	
,, 3	79	40	,,	Hw.	2−7, 3+4·5	8·0	
,, 4	80	t.30	,,	Bn.	1−2, 2−3, 3+9, 4+10	7·6	
,, 7	83	45	,,	F.G.B.	2−4, 3+8	7·7	
,, 7	83	30	,,	Gh.	=2	7·3	
,, 7	83	40	,,	Hw.	2−8, 3+3·5	8·1	
,, 11	87	t.30	,,	Bn.	1−6, 2−10, 3+4, 4+3	8·2	
,, 11	87	40	,,	Hw.	2−6, 3+6	7·9	
,, 13	89	60	2	Go.	2−5, 4+8	7·9	
,, 16	92	t.30	1	Bn.	1−8, 2−11, 3+2, 4+3	8·3	
,, 16	92	45	,,	F.G.B.	2−8, 3+4	8·1	
,, 18	94	40	2	Hw.	2−8, 3+3·5	8·1	
,, 19	95	60	,,	Go.	2−7, 4+7	8·0	
,, 20	8996	T.50	1	Bn.	1−7, 2−10, 3+3·5, 4+3	8·2	
,, 28	9004	,,	,,	,,	1−9, 2−11, 3+2, 4+2	8·4	

(8290) R PEGASI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Dec. 5	9011	45	1	F.G.B.	4−1, 5+5	8·8	
,, 6	12	30	,,	Gh.	3−5, 4−3, 5+3, 6+3	9·0	
,, 6	12	40	2	Hw.	3−5·5, 5+3	9·0	
,, 16	22	60	,,	Go.	5−4, 9+4	9·7	
,, 18	24	t.30	1	Bn.	4−5, 6+1·5	9·2	
,, 19	25	60	2	Go.	6−5, 9+2·5	9·8	
,, 19	25	40	1	Hw.	6−3, 7+1	9·7	
,, 24	30	t.60	,,	Bn.	=6, 7+4	9·4	
,, 28	34	60	,,	Gh.	5−4, =8, 9+4	9·7	
,, 29	35	t.60	,,	Bn.	6−2, 7+2	9·6	
1911.							
Jan. 1	38	,,	,,	,,	6−3·5, 7+1	9·7	
,, 6	43	40	,,	Hw.	9−2, 13+5	10·3	
,, 7	44	60	2	Go.	=9	10·1	
,, 9	46	,,	1	,,	=9, =10	10·1	
,, 15	52	t.75	,,	Bn.	7−1·5, 9+1	10·0	
,, 26	63	40	,,	Hw.	9−4, 13+4	10·5	
,, 30	67	T.50	,,	Bn.	9−5·5, 13+2	10·7	
,, 30	9067	66	,,	F.G.B.	9−6·5, 13+1	10·8	
July 2	9220	198	,,	,,	27−1, 33+4	12·4	
,, 18	36	66	,,	,,	=20	11·8	
,, 21	39	60	2	Gh.	=17	11·7	
,, 30	48	,,	1	,,	=17	11·7	
Aug. 15	64	66	,,	F.G.B.	13−5, 17+2·5	11·4	
,, 16	65	60	,,	Go.	13−2, 16+2	11·1	
,, 25	74	,,	,,	,,	13−2, 15+2	11·1	
,, 25	74	,,	,,	Gh.	13−4, 17+4	11·3	
,, 27	76	45	,,	F.G.B.	=13	10·9	
,, 29	78	90	2	Hw.	=13	10·9	
,, 30	79	60	1	Go.	=13	10·9	
Sept. 2	82	,,	,,	Gh.	=9	10·1	
,, 11	91	,,	,,	Go.	8−1, 9+1	10·0	
,, 12	92	,,	,,	,,	5−6, 9+2	9·9	
,, 15	95	,,	,,	,,	6−2, 9+6	9·5	
,, 15	95	30	2	Gh.	5−3, =8, 9+4·5	9·7	
,, 16	96	60	1	Go.	6−1·5, 7+3	9·5	
,, 19	9299	,,	,,	,,	=6	9·3	
,, 21	9301	,,	2	,,	3−7·5, 6+2	9·2	
,, 23	03	,,	1	,,	3−6, 6+2	9·1	
,, 24	04	30	,,	Gh	=5	9·3	
,, 26	06	45	,,	F.G.B.	=3	8·5	
,, 26	06	60	,,	Go.	4−4, 6+2·5	9·1	
,, 28	08	,,	,,	,,	3−6, 5+3	9·0	
Oct. 1	11	T.50	,,	Bn.	=3, 4+1	8·5	
,, 2	12	30	,,	Go.	=3	8·5	
,, 3	13	,,	,,	,,	1−9, 3+2	8·3	
,, 6	16	40	,,	Hw.	2−9, 3+2	8·2	
,, 10	20	90	2	,,	=3	8·5	
,, 10	20	30	1	Gh.	3−1·5, 4+1	8·6	
,, 11	9321	,,	,,	Go.	1−7, 3+3·5	8·1	Reddish.

(8290) R PEGASI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
Oct. 16	9326	30	1	Bd.	3−2, 4+1	8·6	
,, 17	27	,,	2	Gh.	3−5, =4, 5+3·5	8·9	
,, 18	28	,,	1	Bd.	3−2, 4+1	8·6	
,, 18	28	T.50	,,	Bn.	3+1·5	8·3	
,, 21	31	45	,,	F.G.B.	=4	8·7	
,, 24	34	30	,,	Bd.	=4	8·7	
,, 25	35	,,	2	Gh.	3−1·5, 4+1	8·6	
,, 25	35	,,	1	Go.	1−8, 3+2	8·2	
,, 26	36	,,	,,	Bd.	=4	8·7	
,, 28	38	t.30	,,	Bn.	=3, 4+1	8·5	
,, 28	38	30	2	Gh.	=5	9·3	Doubtful. [C.L.B.]
,, 29	39	,,	1	Go.	1−9, 3+2	8·3	
,, 30	40	T.50	,,	Bn.	3−1, 4+1	8·6	
,, 30	40	30	,,	Gh.	=4	8·7	
,, 31	41	,,	2	Bd.	4−1, 5+4	8·9	
,, 31	41	45	1	F.G.B.	4−1, 5+5	8·8	
,, 31	41	30	,,	Go.	3−3, 6+6	8·7	
Nov. 9	50	T.50	,,	Bn.	4−5, 6+1·5	9·2	
,, 9	50	45	,,	F.G.B.	=5	9·3	
,, 10	51	30	,,	Go.	6−1, 7+4	9·4	
,, 12	53	t.30	,,	Bn.	4−5, 6+1·5	9·2	
,, 12	53	30	,,	Gh.	=8	9·8	
,, 15	56	45	,,	F.G.B.	=5	9·3	
,, 16	57	40	2	Gi.	4−2, 6+3	9·0	
,, 20	61	30	1	Go.	6−2, 7+2	9·6	
,, 30	71	,,	2	,,	6−6, 9+1·5	9·9	
Dec. 4	75	45	1	F.G.B.	5−6·5, 9+1	10·0	
,, 8	79	30	,,	Go.	7−1·5, 9+1	10·0	
,, 9	80	T.50	,,	Bn.	6−4, 7+0·5	9·8	
,, 12	83	40	,,	Gi.	6−2, 7+2	9·6	
,, 14	85	60	,,	Bd.	6−4, 9+4	9·7	
,, 15	86	T.50	,,	Bn.	=9	10·1	
,, 15	86	45	,,	F.G.B.	9−1, 13+6	10·2	
,, 15	86	90	2	Hw.	9−3, 13+5	10·4	
,, 16	87	60	1	Bd.	=9	10·1	
,, 17	88	40	2	Gi.	6−3, 7+3	9·6	
,, 18	89	60	1	Bd.	9−2, 13+6	10·3	
,, 19	90	160	,,	Br.	9−2	10·3	
,, 19	90	T.50	,,	Bn.	9−2, 13+6	10·3	
,, 21	92	60	,,	Bd.	9−2, 13+6	10·3	
,, 22	93	,,	,,	,,	=9	10·1	
,, 23	94	,,	,,	,,	9−2, 13+6	10·3	
,, 23	9394	,,	,,	Go.	9−5, 13+2·5	10·6	
1912.							
Jan. 10	9412	40	2	Gi.	12−1, q+1	10·3	
,, 27	29	T.120	1	Bn.	13−2, 15+2	11·1	
Feb. 10	9443	40	2	Hw.	<9	<10·1	Not seen.
July 19	9603	60	1	Go.	=16	11·3	
,, 30	9614	45	2	Bh.	=21, =22	12·0	

(8290) R PEGASI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Aug. 2	9617	45	2	Bh.	20−1, =21, 22+1	11·9	
,, 20	35	,,	,,	,,	=17, =18, =19	11·7	Red.
,, 29	44	,,	,,	,,	14−4, =15, =16, 17+4	11·3	
Sept. 2	48	,,	1	,,	=9, =10, =12	10·1	
,, 5	51	40	3	Hw.	9−4, 13+4	10·5	
,, 6	52	45	1	Bh.	=9, =10	10·1	
,, 17	63	40	,,	Gi.	=6	9·3	
,, 17	63	,,	2	Hw.	5−1, 9+7·5	9·4	
,, 18	64	45	1	Bh.	5−4, =7, =8, 10+4	9·8	
,, 20	66	41	2	Gd.	=5	9·3	
,, 21	67	45	1	Bh.	4−6, =5, 7+6	9·3	
,, 30	76	,,	,,	,,	=4	8·7	
Oct. 1	77	,,	,,	,,	=4	8·7	
,, 2	78	T.50	,,	Bn.	4−1	8·8	
,, 2	78	40	,,	Gi.	3−1, 4+2	8·5	
,, 4	80	45	,,	Bh.	=3	8·5	
,, 7	83	,,	,,	,,	2−10, =3, 4+5	8·3	
,, 7	83	T.50	,,	Bn.	3−0·5, 4+2	8·5	
,, 8	84	40	2	Hw.	2−9, 3+2	8·2	
,, 10	86	t.30	1	Bn.	f−5·5, 3+2	8·3	
,, 10	86	40	,,	Gi.	f−3, g−1, 3+1	8·2	
,, 11	87	45	,,	Bh.	2−10, =3, 4+5	8·3	
,, 14	90	T.50	,,	Bn.	2−11, 3+2, 4+3	8·4	
,, 14	90	40	,,	Gi.	f−3, 3+3	8·1	
,, 16	92	60	,,	Go.	2−9·5, 4+5	8·2	
,, 17	93	T.50	,,	Bn.	1−4, 2−9, 4+5, 3+6·5	8·0	
,, 19	95	45	2	Bh.	2−6, 3+6	7·9	
,, 22	9698	,,	1	,,	2−4, 3+8	7·7	
,, 29	9705	,,	,,	,,	2−2, 3+9	7·5	Pale red
,, 29	05	40	,,	Hw.	2−6, 3+6	7·9	
,, 30	06	45	,,	Bh.	=1	7·4	
Nov. 1	08	40	,,	Gi.	1−1·5, f+1	7·6	
,, 2	09	45	,,	Bh.	=1	7·4	
,, 3	10	,,	,,	,,	=2	7·3	
,, 3	10	t.30	,,	Bn.	1−3, 2−4, 3+7, 4+10	7·7	
,, 7	14	45	,,	Bh.	=1	7·4	In B. 7·3.
,, 10	17	,,	,,	,,	=2	7·3	
,, 10	17	60	,,	Go.	2−6, 3+6	7·9	
,, 11	18	45	,,	Bh.	=1	7·4	
,, 11	18	40	,,	Hw.	2−7, 3+4·5	8·0	
,, 13	20	T.50	,,	Bn.	1−6, 2−10, 4+3, 3+6	8·1	
,, 17	24	45	,,	Bh.	1−2, 2−3, 3+8, 4+11	7·6	
,, 20	27	,,	2	,,	1−2, 2−3	7·6	
,, 25	32	,,	,,	,,	1−2, 2−3, 3+8, 4+11	7·6	
,, 25	32	40	1	Gi.	1−3, f−1, =g	7·8	
,, 29	36	T.50	,,	Bn.	1−7, 2−10, 3+3·5, 4+4	8 2	
,, 29	36	45	,,	Bh.	1−5, 2−7, 3+5, 4+7	8·0	
,, 30	9737	40	,,	Hw.	2−10, 3+1	8·3	

(8290) R PEGASI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Dec. 3	9740	40	1	Gi.	g−1, 3+3	8·1	
,, 6	43	45	,,	Bh.	1−3·5, 2−7, 3+7, 4+7	7·9	
,, 8	45	,,	,,	,,	1−8, 2−10, 3+3, 4+3	8·3	
,, 9	46	40	,,	Gi.	g−2·5, 3+3	8·2	
,, 10	47	45	2	Bh.	3−3, =4, 6+6	8·7	Red.
,, 12	49	t.30	1	Bn.	1−9, 2−12, 3+2, 4+1	8·4	
,, 12	49	40	,,	Hw.	2−10, 3+1	8·3	
,, 16	53	45	,,	Bh.	2−7, =3, 4+7	8·2	
,, 20	57	40	2	Gi.	3−1, 4+2	8·5	
,, 23	60	45	1	Bh.	3−4, =4, 5+4	8·8	
,, 27	64	30	,,	Go.	3−8, 9+8	9·3	
,, 28	65	45	,,	Bh.	=5, =6	9·3	
,, 29	66	T.50	,,	Bn.	6−3, 7+1	9·7	
,, 30	67	50	,,	Ma.	3−8, 9+8	9·3	
,, 31	68	45	,,	Bh.	=5, =6	9·3	
,, 31	68	40	,,	Gi.	4−2, 6+2	9·0	
1913.							
Jan. 2	70	45	,,	Bh.	4−4·5, =5, 9+9	9·2	
,, 5	73	,,	2	,,	6−4, =7, 9+4	9·8	
,, 5	73	T.50	1	Bn.	6−1, 7+3·5	9·5	
,, 5	73	50	,,	Ma.	3−7, 9+10	9·1	
,, 6	74	40	2	Gi.	4−4, 6+1·5	9·1	
,, 6	74	,,	,,	La.	4−3, 6+3	9·0	
,, 9	77	T.50	1	Bn.	6−1, 7+4	9·4	
,, 9	77	50	,,	Ma.	3−8, 9+8	9·3	
,, 12	80	T.50	,,	Bn.	6−2, 7+2	9·6	
,, 18	86	45	,,	Bh.	7−1, 9+1	10·0	
,, 23	91	,,	2	,,	9−2·5, =11, 13+5	10·4	
,, 26	94	T.95	1	Bn.	9+1	10·0	
,, 31	9799	45	2	Bh.	=13, =14	10·9	
Feb. 8	9807	,,	,,	,,	9−8, =13, 17+8	10·9	
,, 27	26	90	,,	,,	13−4, =15, 17+4	11·3	
Mar. 27	54	,,	,,	,,	17−2	11·9	
Apr. 1	59	,,	,,	,,	<15	<11·3	Not seen.
,, 28	86	,,	1	,,	<25	<12·4	Not seen.
May 11	9899	,,	2	,,	25−5, 29−3	12·9	
,, 25	9913	150	,,	,,	34−1, 35−2	13·1	M.
,, 27	15	,,	,,	,,	35−2, 36−2	13·2	M.
June 4	23	,,	1	,,	<25	<12·4	Not seen. M.
,, 30	49	,,	,,	,,	=25, 27−2	12·5	M.
July 8	57	,,	,,	,,	20−2, =21, 27+2	12·0	M.
,, 26	75	90	,,	,,	=17, =19	11·7	
,, 29	78	79	,,	Ma.	13−4, 17+4	11·3	
,, 30	79	90	,,	Bh.	=15, 17+2	11·4	
Aug. 1	81	,,	,,	,,	15−2, 17+2	11·5	
,, 4	9984	,,	,,	,,	16−2, 19+2	11·5	

(8290) R PEGASI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Aug. 16	9996	90	2	Bh.	13+1, 14−1	10·9	
,, 20	0000	,,	1	,,	13−1, 14−1	11·0	
,, 27	07	,,	2	,,	13−2·5, 17+5	11·2	
Sept. 2	13	,,	,,	,,	13−1·5, 15+3	11·0	
,, 3	14	79	1	Ma.	13−2, 15+1	11·2	
,, 5	16	90	,,	Bh.	13−1, =14, 15+3	11·0	
,, 7	18	T.95	,,	Bn.	13−3, 15+1·5	11·2	
,, 8	19	79	,,	Ma.	13−4·5, 27+9	11·4	
,, 9	20	90	,,	Bh.	=13, 14+1	10·8	
,, 20	31	,,	,,	,,	9−3, 13+3	10·5	
,, 24	35	79	,,	Ma.	13+1	10·8	
,, 26	37	T.95	,,	Bn.	9−6, 13+2	10·7	
,, 27	38	45	,,	Br.	9−4, 13+4	10·5	
,, 27	38	150	,,	Bh.	9−5, 13+3	10·6	
,, 30	41	40	2	Hw.	9−5, 13+2	10·6	
Oct. 1	42	45	1	Bh.	=9, =10, =12	10·1	
,, 3	44	T.95	,,	Bn.	9−5, 13+2·5	10·6	
,, 9	50	90	2	Bh.	9+2, 12+2	9·9	
,, 16	57	,,	1	,,	4−5, =6, 9+8	9·3	
,, 22	63	45	,,	,,	3−2, =4	8·7	
,, 22	63	40	2	Hw.	3−4, 5+4	8·9	
,, 23	64	50	,,	Ma.	5+5	8·8	
,, 25	66	,,	,,	,,	3−3	8·8	
,, 31	72	45	1	Br.	2−9, 3+3	8·2	
,, 31	72	,,	2	Bh.	3+1, 4+2	8·4	
Nov. 1	73	40	1	Hw.	2−10, 3+1	8·3	
,, 3	75	45	,,	Bh.	1−3·5, 2−3, 3+7, 4+10	7·7	
,, 5	77	T.50	,,	Bn.	1−3·5, 2−9, 3+7, 4+4·5	8·0	
,, 7	79	45	,,	Bh.	=1, =2	7·3	
,, 14	86	40	2	Hw.	2−7, 3+4·5	8·0	
,, 17	89	45	1	Bh.	1−2, 2−2	7·5	
,, 18	90	50	,,	Ma.	2−9, 3+2·5	8·2	
,, 22	94	T.50	,,	Bn.	1−3·5, 2−3, 3+7, 4+11	7·7	
,, 22	0094	45	,,	Bh.	1−1, 2−2	7·5	
,, 28	0100	T.50	,,	Bn.	1−2·5, 2−4, 3+8, 4+9	7·7	
,, 28	00	20	2	La.	f−2, 3+5	7·9	
,, 29	01	40	,,	Hw.	2−7, 3+4·5	8·0	
Dec. 1	03	45	1	Br.	2−6, 3+5	7·9	
,, 1	03	,,	,,	Bh.	1−3, 2−5, 3+7, 4+8	7·8	
,, 1	03	20	,,	La.	f−4, 3+2	8·2	
,, 4	06	45	,,	Bh.	2−8, 3+2, 4+5·5	8·2	
,, 9	11	,,	2	,,	=3	8·5	
,, 11	13	40	1	La.	3−1, 4+2	8·5	
,, 12	14	45	2	Bh.	2−10, 4+3	8·4	
,, 14	16	T.50	1	Bn.	4−1, 6+5·5	8·8	
,, 16	18	45	,,	Bh.	3−4, =4, 5+4	8·9	
,, 18	20	T.50	,,	Bn.	4−1, 6+5	8·8	
,, 18	0120	50	2	Ma.	3−3	8·8	Difficult.

(8290) R PEGASI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Dec. 21	0123	45	1	Bh.	3−6·5, 4−3, 5+3, 6+2	9·1	
,, 21	23	20	,,	La.	4−4, l−1, 6+1	9·2	
,, 23	25	90	,,	Bh.	=5	9·3	
,, 24	26	45	,,	Br.	3−1, 4+2	8·5	Doubtful. [C.L.B.]
,, 27	29	40	,,	La.	=6, n+2	9·4	
,, 28	30	50	,,	Ma.	3−7, 9+10	9·1	
,, 30	32	T.50	,,	Bn.	=6	9·3	
1914.							
Jan. 5	38	,,	,,	,,	6−3, 7+2	9·6	
,, 6	39	90	,,	Bh.	6−4, =7, 9+4	9·8	
,, 11	44	,,	2	,,	=9, =10, =12	10·1	
,, 11	44	79	,,	Ma.	9+4·5	9·7	
,, 17	50	90	3	Hw.	9−2, 13+5	10·3	
,, 23	56	T.50	1	Bn.	6−4, 7+0·5	9·8	
,, 23	56	90	,,	Bh.	9−5, 13+2·5	10·6	
,, 23	56	79	,,	Ma.	9−3, 13+5	10·4	
Feb. 4	68	160	,,	Br.	9−5, 13+3	10·6	
,, 5	69	90	2	Bh.	=13	10·9	
,, 21	0185	,,	1	,,	13−4, =15, 17+4	11·3	
Mar. 21	0213	150	2	,,	15−2, 17+2	11·5	
Apr. 12	35	90	1	,,	13−6, 17+2	11·5	
,, 18	41	,,	,,	,,	=17	11·7	
,, 27	50	150	,,	,,	17−1, 20+0·5	11·8	
May 15	68	,,	2	,,	=21, =24	12·1	
,, 16	69	,,	,,	,,	=21, =25	12·2	
,, 21	74	,,	1	,,	=25, =27	12·4	
,, 25	78	,,	,,	,,	=25, =27	12·4	
,, 26	79	,,	,,	,,	=27	12·3	
June 10	94	,,	,,	,,	=25	12·4	
,, 13	0297	,,	2	,,	=25	12·4	
,, 25	0309	,,	1	,,	25−1	12·5	
,, 29	13	,,	2	,,	25−1, 27−2, 33+2	12·5	
July 6	20	,,	1	,,	25+1, 31+3	12·4	
,, 10	24	,,	,,	,,	21−2, 25+2	12·2	
,, 19	33	90	,,	,,	20−1, =21	11·9	
,, 23	37	183	2	Ma.	=25	12·4	About.
,, 30	44	150	1	Bh.	17−2·5, =20, =21, 25+5	11·9	
Aug. 3	48	,,	,,	,,	15−3·5, =17, 25+7	11·7	
,, 12	57	90	,,	,,	15−3·5, =17, 25+7	11·7	
,, 16	61	,,	,,	,,	15−2, 17+2	11·5	
,, 23	68	,,	,,	,,	=15, =16	11·3	
,, 26	71	150	,,	,,	13−1·5, 15+3	11·0	
,, 28	73	T.95	,,	Bn.	13−3, 15+1·5	11·2	
Sept. 5	81	90	,,	Bh.	=13	10·9	
,, 10	0386	,,	2	,,	13−1·5, 15+3	11·0	

(8290) R PEGASI—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Sept. 11	0387	T.95	1	Bn.	9−6·5, 13+1	10·8	
,, 17	93	,,	,,	,,	9−6, 13+2	10·7	
,, 18	94	45	2	Bh.	13−1	11·0	
,, 20	96	90	1	,,	13+0·5	10·8	
,, 22	0398	,,	,,	,,	9−6, 13+2	10·7	
,, 25	0401	,,	,,	,,	9−5, 13+2·5	10·6	
,, 25	01	T.95	,,	Bn.	9−5, 13+2·5	10·6	
,, 28	04	90	,,	Bh.	8−2, =9, =10	10·1	
Oct. 4	10	,,	2	,,	=8, 10+2	9·9	
,, 6	12	40	1	Bc.	n−2, =7	9·8	
,, 10	16	45	,,	Bh.	=6, 7+5	9·3	
,, 18	24	,,	,,	,,	4−5, =5, 9+8	9·3	
,, 18	24	40	,,	Bc.	l−1, 6+1	9·2	
,, 27	33	90	,,	Bh.	4−2, 5+4	8·9	
Nov. 2	39	40	2	Hw.	=3	8·5	
,, 3	40	45	1	Bh.	2−10, =3, 4+3	8·4	
,, 7	44	,,	,,	,,	2−8, 3+2, 4+5	8·2	
,, 7	44	40	,,	Bc.	3−2, 4+1	8·6	
,, 10	47	,,	,,	,,	3−1, 4+2	8·5	
,, 10	47	45	,,	Bh.	2−9, 4+5	8·2	
,, 12	49	40	2	Hw.	2−9, 3+2	8·2	
,, 15	52	45	1	Bh.	2−8, 4+5·5	8·1	
,, 16	53	T.50	,,	Bn.	1−6, 2−9, 3+4, 4+4	8·1	
,, 20	57	45	,,	Bh.	1−8, 2−10, 3+2·5, 4+3	8·3	
,, 22	59	,,	,,	,,	1−3·5, 2−5, 3+7, 4+8	7·8	
,, 25	62	40	2	Hw.	2−7, 3+4·5	8·0	
,, 28	65	45	1	Bh.	1+2, 2+1	7·2	Doubtful. [C.L.B.]
Dec. 1	68	,,	,,	,,	1−3, 2−3, 3+8, 4+10	7·7	
,, 4	71	40	,,	Bc.	1−3, =f	7·7	
,, 5	72	T.50	,,	Bn.	1−6, 2−9, 3+4, 4+4	8·1	
,, 5	72	40	,,	Hw.	2−7, 3+3·5	8·1	
,, 7	74	45	,,	Bh.	1−5, 2−4·5, 3+5, 4+9	7·8	
,, 7	74	75	,,	Ch.	2−6, 3+6	7·9	
,, 10	77	T.50	,,	Bn.	1−3·5, 2−9, 3+7, 4+4	8·0	
,, 12	79	40	,,	Bc.	1−3, =f	7·7	
,, 14	81	45	,,	Bh.	1−8, 2−10, 3+3, 4+4	8·2	
,, 19	86	,,	,,	,,	3−3, 4−2, 5+6	8·8	
,, 21	88	75	2	Ch.	2−9, 3+3	8·2	
,, 21	88	40	,,	Hw.	=3	8·5	
,, 26	93	45	1	Bh.	3−2, 4+1	8·6	
,, 30	0497	,,	,,	,,	4−2, 5+4	8·9	

(8600) R CASSIOPEIÆ. (V. 1.)

H.D. 235350.

NOTES.

Star S unidentified, 12·3 m. estimated $\triangle\alpha - 10^s \triangle\delta - 0'{\cdot}4$.

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Jan. 3	8675	t.30	2	Bn.	3−2, 4+1	6·9	Very red.
„ 10	82	„	1	„	3−1, 4+1·5	6·8	
„ 16	88	45	„	Br.	1−2, 3+2, 4+3	6·5	
„ 19	91	t.30	„	Bn.	=4, 6+1	7·0	Very red.
„ 21	93	T.25	„	„	=4, 6+1	7·0	
„ 26	8698	t.30	„	„	=4, 6+1	7·0	Red.
„ 30	8702	„	„	„	4−1, 6+0·5	7·1	
„ 30	02	50	2	Ma.	6−1	7·3	Red. Difficult.
Feb. 3	06	„	1	„	6−6, 12+6	7·8	
„ 3	06	t.30	„	Bn.	=5, =6, 7+1, 8+1	7·4	
„ 4	07	T.25	„	„	5−1, 6−1, =7, 8+1	7·5	
„ 8	11	„	„	„	=5, =6, 7+1, 8+1·5	7·4	
„ 15	18	„	„	„	5−1, 6−1, 7+1, 8+0·5	7·4	
„ 15	18	60	„	Gh.	=5, 6−4, 9+6	7·5	
„ 18	21	45	„	Br.	4−1, 6+1	7·1	
„ 27	30	50	„	Ma.	6−9, 12+4·5	8·1	Dull red.
„ 28	31	60	„	Gh.	8−7, =11, 17+5	8·3	
Mar. 1	32	„	„	„	=10, =11	8·1	
„ 1	32	45	„	Br.	=6	7·2	
„ 3	34	50	2	Ma.	5−3, 9+3	7·8	Dull red.
„ 4	35	60	1	Gh.	8−7, 10−5, 13+2, 16+3	8·5	
„ 4	35	50	„	Ma.	9+1, 18+5	8·3	
„ 5	36	„	„	Gh.	10−5, =17, 15+3	8·6	
„ 8	39	45	„	Br.	=6	7·2	
„ 16	47	60	„	Gh.	15−1, =16, 21+4	8·9	
„ 20	51	45	2	Br.	6−3	7·5	
„ 29	60	60	1	Gh.	18−1, 21+3	9·1	
„ 31	62	45	„	Br.	8−6, 13+1	8·4	
„ 31	62	60	„	Gh.	16−3, 18−2, 21+2, 25+3	9·2	
Apr. 5	67	„	„	„	16−3, 18−2, 21+2, 25+2	9·2	
„ 27	89	„	„	„	18−4, =21, =25, 30+6	9·4	
May 7	8799	160	2	Br.	21+2	9·2	
„ 9	8801	60	1	Gh.	21−2, 30+3	9·6	
„ 12	04	„	„	„	21−2, 23−1, 26+1, 30+3	9·6	
„ 18	10	„	„	Br.	30−1, 43+5	10·0	
„ 29	21	160	„	„	30−3, 43+3	10·2	
„ 31	8823	120	„	Gh.	30−6, =43, 52+9	10·5	

(8600) R CASSIOPEIÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
June 13	8836	240	1	Br.	52+4	11·0	
,, 14	37	T.120	,,	Bn.	51−2, 52+1	11·2	
,, 19	42	T.150	,,	,,	52+1	11·3	
,, 19	42	240	2	Gh.	=51, =52	11·2	
,, 29	52	120	,,	,,	52−2, 58+8	11·6	
July 3	56	240	1	Br.	52−3, 58+7	11·7	
,, 12	65	183	,,	Ma.	52−7, 58+5	12·0	
,, 22	75	,,	2	,,	51−12, 58+2	12·2	
,, 31	84	,,	1	,,	58+1·5	12·3	
,, 31	84	240	,,	Br.	57−2, 58+1	12·3	
Aug. 2	86	183	,,	Ma.	58+1	12·3	
,, 6	90	t.120	,,	Bn.	54−1, 56+1	11·5	
,, 7	91	183	,,	Ma.	=58	12 4	
,, 8	92	160	,,	Br.	57−2, 58+1	12·3	
,, 10	94	183	,,	Ma.	=58	12·4	
,, 12	96	,,	,,	,,	=58, =S	12·4	
,, 15	8899	,,	,,	,,	=S	12·3	
,, 20	8904	160	,,	Br.	58−2, w+2	12·6	
,, 26	10	183	,,	Ma.	S−2	12·5	
,, 26	10	132	2	F.G.B.	w−3, z+6	13·1	
,, 31	15	320	1	Br.	58−4, w+1	12·8	
Sept. 3	18	183	,,	Ma.	S−2·5	12·6	
,, 3	18	198	,,	F.G.B.	=w	12·8	
,, 9	24	,,	,,	,,	w−1, y+5	12·9	
,, 12	27	,,	,,	,,	w−1, y+5	12·9	
,, 16	31	240	2	Br.	w−1	12·9	Difficult.
,, 20	35	198	1	F.G.B.	=w	12·8	
,, 27	42	,,	,,	,,	=w	12·8	
,, 27	42	T.150	,,	Bn.	58−1	12·5	
Oct. 9	54	160	2	Br.	=w	12·8	About.
,, 10	55	198	1	F.G.B.	58−2, w+2	12·6	
,, 14	59	240	,,	Br.	=w	12·8	
,, 28	73	198	,,	F.G.B.	58−1·5, w+3	12·5	
Nov. 1	77	90	2	Hw.	58−4·5	12·9	
,, 1	77	198	1	F.G.B.	58−0·5, w+3	12·5	
,, 4	80	160	,,	Br.	58−4, w+2	12·7	
,, 7	83	90	2	Hw.	58−6	13·0	
,, 7	83	T.120	,,	Bn.	58−3	12·7	
,, 7	83	198	1	F.G.B.	=58	12·4	
,, 8	84	240	,,	Br.	58−2, w+2	12·6	
,, 15	91	160	,,	,,	58−3	12·7	
,, 16	92	198	,,	F.G.B.	=58	12·4	
,, 21	97	T.200	,,	Bn.	58−2	12·6	
,, 21	8997	90	2	Hw.	58−2·5	12·7	
,, 25	9001	120	,,	Gh.	52−8, =57, 58+2	12·2	
,, 28	04	T.150	1	Bn.	58−1·5	12·6	
,, 29	05	240	,,	Br.	58−1	12·5	
Dec. 6	12	120	2	Hw.	52−9, 58+1	12·3	
,, 6	9012	198	1	F.G.B.	=57	12·1	

(8600) R CASSIOPEIÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1910.							
Dec. 6	9012	120	2	Gh.	52−5, =57, 58+5	12·0	
„ 19	25	„	1	Hw.	52−5, 58+5	11·9	
„ 19	25	T.120	„	Bn.	54−7, 58+2	12·2	
„ 20	26	240	„	Br.	52−5, 58+5	11·9	
„ 22	28	T.120	„	Bn.	=52, =54	11·4	
„ 24	30	240	„	Br.	52−4, 57+4	11·7	
„ 24	30	198	„	F.G.B.	=56	11·6	
„ 27	33	t.120	2	Bn.	54−2	11·6	
1911.							
Jan. 1	38	60	„	Gh.	=54, =56	11·5	
„ 1	38	240	1	Br.	52−2	11·6	
„ 6	43	198	2	F.G.B.	=52	11·4	
„ 6	43	t.120	1	Bn.	52−0·5, =54	11·4	
„ 16	53	160	„	Br.	=52	11·4	
„ 26	63	120	2	Hw.	30−4·5, 43+1	10·4	
„ 28	65	160	1	Br.	21−6, =30, 43+3	10·0	
„ 28	65	198	2	F.G.B.	=30	9·9	
„ 30	67	T.50	1	Bn.	18−2·5, 21+1	9·3	
„ 30	67	120	2	Gh.	=21	9·4	
„ 30	67	66	1	F.G.B.	21−4·5, 30+1	9·8	
Feb. 11	79	45	„	Br.	8−3, 13+5	8·1	
„ 19	87	30	„	Gh.	8−7, 10−4, 15+4, 16+5	8·4	
„ 19	87	t.30	„	Bn.	8−2, 10+1	7·9	
„ 20	88	„	„	„	7−5, 8−1, 9+2	7·9	
„ 22	90	T.25	„	„	7−2, =8, 9+5, 10+2	7·7	
„ 22	90	45	„	F.G.B.	8−1, 10+2	7·8	
„ 25	93	„	„	Br.	4−1, 6+1	7·1	
„ 25	93	T.25	„	Bn.	8−1·5	7·9	
„ 28	9096	45	„	F.G.B.	6−4, 8+2	7·5	
Mar. 4	9100	„	„	Br.	4−1, 6+1	7·1	
„ 7	03	T.25	„	Bn.	5−1·5, 7−1, 8+1	7·6	
„ 9	05	„	„	„	6−1, =7	7·3	
„ 24	20	40	„	Hw.	4+0·5, 6+2	6·9	
Apr. 3	30	45	„	Br.	4+2, 6+5	6·7	
„ 8	35	40	„	Hw.	4+0·5, 6+2	6·9	
„ 19	46	45	„	F.G.B.	3−2, 6+2	6·9	
„ 22	49	„	„	Br.	=6	7·2	
„ 28	55	„	„	F.G.B.	5+2, 6−1	7·3	
May 5	62	„	2	Br.	6−1	7·3	
„ 21	78	„	1	„	6−5, =8	7·7	
„ 22	79	„	„	F.G.B.	8−4, 12+2	8·2	
„ 27	84	60	„	Gh.	=15, =16	8·9	
June 3	91	45	„	F.G.B.	=16	8·9	
„ 3	91	30	„	Gh.	=13, =14	8·7	
„ 6	94	90	„	Hw.	=13, 18+4, 21+8	8·6	
„ 7	9195	T.25	„	Bn.	11−3, =12, 14+2, 16+5	8·5	
„ 18	9206	45	„	Br.	=13	8·6	

(8600) R CASSIOPEIÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1911.							
June 18	9206	60	1	Gh.	16−3, =18, 21+2	9·1	
„ 24	12	45	„	F.G.B.	18−1, 21+2·5	9·1	
„ 28	16	30	„	Gh.	18−4, =21, 30+6	9·4	
July 4	22	66	„	F.G.B.	21−2, 30+4	9·6	
„ 5	23	60	2	Gh.	21−3, 30+3	9·7	
„ 12	30	„	1	„	18−5, =21, 30+5	9·4	
„ 18	36	„	„	„	=28, =30	9·9	
„ 21	39	„	„	„	30−5·5, =36, 52+8	10·4	
„ 21	39	„	„	Br.	21−3, 30+3	9·7	
„ 21	39	66	„	F.G.B.	21−4·5, 30+1	9·8	
„ 21	39	T.120	„	Bn.	21−4, =30	9·9	
„ 25	43	60	„	Bi.	21−3, 30+2	9·7	
„ 30	48	120	„	Gh.	=38	10·3	
„ 30	48	200	„	Bi.	21−4, 30+1	9·8	
„ 31	49	T.120	„	Bn.	51−1, 52+3	11·1	
Aug. 1	50	160	„	Br.	30−4, 51+6	10·4	
„ 9	58	40	2	Hw.	51+4, 52+8	10·6	
„ 13	62	60	1	Gh.	=52	11·4	
„ 14	63	200	„	Bi.	52−1	11·5	
„ 15	64	198	„	F.G.B.	=52	11·4	
„ 18	67	160	„	Br.	51−1, 52+3	11·1	
„ 22	71	200	„	Bi.	52−1, =54	11·4	
„ 24	73	198	„	F.G.B.	52−0·5, 56+2	11·4	
„ 25	74	120	„	Gh.	52−1·5, =54, 57+6	11·5	
„ 29	78	90	„	Hw.	52−1, 58+8	11·5	
Sept. 1	81	240	„	Br.	52−2, 57+5	11·6	
„ 2	82	120	„	Gh.	52−4, 57+4	11·7	
„ 15	95	198	„	F.G.B.	=57	12·1	
„ 17	97	160	„	Br.	52−5, 57+2	11·9	
„ 18	9298	180	2	Gh.	=57	12·1	
„ 24	9304	120	„	„	=57	12·1	
Oct. 1	11	198	1	F.G.B.	58−1	12·5	
„ 10	20	120	2	Gh.	=58	12·4	
„ 21	31	160	1	Br.	58−2, w+2	12·6	
„ 26	36	132	„	F.G.B.	w−1, y+5	12·9	
„ 30	40	160	„	Br.	w+1	12·7	
Nov. 1	42	198	„	F.G.B.	57−4, w+2	12·6	
„ 12	53	264	„	„	57−4, w+2	12·6	
„ 20	61	240	„	Br.	w−5, z+4	13·3	Very faint.
Dec. 3	74	160	„	„	<58	<12·4	Not seen.
„ 9	80	198	„	F.G.B.	57−4, w+2	12·6	
„ 11	82	T.150	„	Bn.	<58	<12·4	Very faint.
„ 15	86	160	„	Br.	w−1	12·9	
„ 20	9391	132	„	F.G.B.	57−1, w+5·5	12·2	
1912.							
Jan. 5	9407	160	2	Br.	58−2, w+2	12·6	
„ 5	07	198	1	F.G.B.	58−1·5, w+3	12·5	
„ 9	9411	„	„	„	58−1·5, w+3	12·5	

(8600) R CASSIOPEIÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
Jan. 21	9423	160	2	Br.	=58	12·4	About.
,, 26	28	T.250	1	Bn.	58−4	12·8	
,, 26	28	198	,,	F.G.B.	52−8, 58+2	12·2	
Feb. 8	41	160	,,	Br.	58−1	12·5	
,, 11	44	132	,,	F.G.B.	=57	12·1	
,, 16	49	160	2	Br.	=58	12·4	About.
Mar. 6	68	,,	1	,,	57−1, 58+2	12·2	
,, 7	69	198	,,	F.G.B.	52−4, 57+4	11·7	
,, 19	81	160	,,	Br.	52−5, 57+2·5	11·9	
,, 19	9481	180	2	Dk.	=58	12·4	Glimpsed.
Apr. 10	9503	40	,,	La.	=30	9·9	
,, 16	09	160	1	Br.	16−4, 21+1	9·3	
,, 20	13	120	,,	Gh.	=21	9·4	
,, 24	17	40	,,	Gi.	9−4, 15+2	8·6	
,, 24	17	,,	,,	La.	=18	9·0	
,, 26	19	20	,,	,,	=16	8·9	
May 6	29	40	,,	Gi.	5−2, 9+2	7·8	
,, 9	32	20	,,	La.	5−3, =8, 9+3	7·8	
,, 16	39	45	,,	F.G.B.	3−4, 6+0·5	7·1	
,, 17	40	40	,,	Gi.	3−2, 6+2	6·9	
,, 20	43	,,	,,	,,	3−1, 6+2	6·9	
,, 20	43	45	,,	F.G.B.	3−5, 5+2·5	7·2	
,, 29	52	,,	,,	Br.	4+2, 6+5	6·7	
,, 31	54	40	,,	La.	5+2·5, 6−1	7·3	
June 2	56	20	2	,,	=3	6·7	
,, 2	56	45	1	F.G.B.	=5	7·5	
,, 2	56	30	,,	Gh.	=6	7·2	
,, 4	58	40	,,	Gi.	3−1·5, 6+3	6·9	
,, 4	58	20	,,	La.	=3	6·7	
,, 6	60	45	,,	Br.	3−1, 4+1	6·8	
,, 6	60	,,	,,	F.G.B.	=6	7·2	
,, 7	61	40	,,	Gi.	3−2·5, 6+1	7·0	
,, 8	62	20	,,	La.	3−1, 6+3	6·8	
,, 10	64	30	,,	Gh.	=6	7·2	
,, 10	64	40	,,	Gi.	3−2·5, 6+1	7·0	
,, 14	68	,,	,,	,,	5+1, 6−0·5	7·3	
,, 15	69	,,	,,	La.	5+1, 6−2	7·4	
,, 17	71	,,	,,	Gi.	=5, 6−1	7·4	
,, 20	74	45	,,	F.G.B.	6−3, 8+3	7·4	
,, 21	75	30	,,	Gh.	=6	7·2	
,, 22	76	20	,,	La.	5−1·5, 9+5	7·7	
,, 25	79	40	,,	Gi.	5−2, 9+2	7·8	
,, 30	84	20	2	La.	=9, 11+1	8·1	
July 5	89	,,	1	,,	11−3, 15+3	8·5	
,, 10	94	40	,,	Gi.	5−5, 9+3	7·9	
,, 12	96	,,	2	,,	5−3·5, 9+2	7·9	
,, 15	9599	20	1	La.	15+2	8·6	
,, 17	9601	T.50	,,	Bn.	9−0·5, 12+3	8·2	
,, 17	01	40	,,	Gi.	5−5, 9+2	8·0	
,, 20	9604	20	2	La.	15+2	8·6	Perhaps brighter.

(8600) R CASSIOPEIÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1912.							
July 26	9610	20	1	La.	=13	8·6	
,, 26	10	40	,,	Gi.	9−1, 15+4	8·3	
Aug. 1	16	,,	,,	Gi.	9−2, 15+3	8·4	
,, 2	17	45	2	Br.	16−1, 21+4	9·0	
,, 3	18	40	1	La.	15−2, 21+4	9·0	
,, 10	25	,,	,,	Gi.	9−5, 15+2	8·6	
,, 12	27	,,	,,	La.	15−4, 21+1	9·3	
,, 17	32	,,	,,	Gi.	9−4, 15+1	8·6	
,, 23	38	,,	,,	,,	15+2	8·6	Perhaps fainter.
,, 23	38	,,	,,	La.	21−2, 30+3	9·6	
,, 27	42	,,	,,	Gi.	15−1, 21+3	9·0	
,, 29	44	,,	,,	La.	21−3, 30+2	9·7	
Sept. 2	48	45	,,	Br.	=18	9·0	
,, 2	48	T.120	,,	Bn.	21−4, 30+1	9·8	
,, 3	49	40	2	La.	21−4, 30+2	9·8	
,, 5	51	,,	1	Hw.	21−2, 30+4	9·6	
,, 7	53	,,	,,	Gi.	15−3, 21+1·5	9·2	
,, 15	61	,,	2	La.	30−2, 43+4	10·1	
,, 17	63	160	1	Br.	=21	9·4	
,, 17	63	40	,,	Gi.	21−1·5, 30+3	9·6	
,, 17	63	,,	2	Hw.	30−5, 43+1	10·4	
,, 20	66	T.50	1	Bn.	21−2, 26+1	9·6	Very red.
,, 20	66	41	2	Gd.	21−3, 30+3	9·7	
,, 21	67	90	1	Hw.	30−3, 43+3	10·2	
,, 21	67	T.94	,,	Bl.	18−3, 21+1	9·3	In t.22, 9·7.
,, 24	70	,,	,,	,,	=21	9·4	In t.22, 9·9.
Oct. 2	78	T.95	,,	Bn.	30−2, 36+2	10·1	Red.
,, 10	86	160	,,	Br.	30−4, 43+1	10·4	
,, 10	86	T.95	,,	Bn.	36+1, 43+3	10·2	
,, 10	86	T.94	,,	Bl.	30−1, 36+3	10·0	In t.22, 10·3.
,, 10	86	40	2	Gi.	30−1, 43+2	10·2	
,, 11	87	,,	,,	La.	=43	10·5	
,, 14	90	90	,,	Hw.	=43	10·5	
,, 15	9691	40	1	Gi.	30−3, 43+3	10·2	
,, 29	9705	160	2	Br.	43−2, 52+6	10·7	
Nov. 1	08	40	,,	Gi.	=51	11·0	
,, 11	18	160	1	Br.	=52	11·4	
,, 18	25	T.94	,,	Bl.	43−4, 52+4	10·9	
,, 30	37	160	,,	Br.	=57	12·1	
,, 30	37	T.150	,,	Bn.	54−8, 58+1·5	12·2	
Dec. 14	51	230	,,	Th.	=S	12·3	
,, 16	53	300	,,	,,	57−3, w+3	12·5	
,, 16	53	160	,,	Br.	58−2	12·6	
,, 16	53	T.120	,,	Bn.	54−0·5, 56+1	11·5	
,, 28	65	200	,,	Br.	58−3, w+1	12·7	
,, 28	65	300	2	Th.	58−3, w+1·5	12·7	
,, 29	66	T.200	1	Bn.	58−5	12·9	
,, 30	67	T.167	,,	,,	58−3	12·7	
,, 31	9768	300	,,	Th.	58−3, w+1·5	12·7	

(8600) R CASSIOPEIÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Jan. 1	9769	T.200	1	Bn.	58−4	12·8	
„ 5	73	145	„	Th.	=w	12·8	
„ 6	74	160	„	Br.	=w	12·8	
„ 8	76	T.94	„	Bl.	=w	12·8	
„ 12	80	T.150	„	Bn.	58−4	12·8	
„ 25	93	120	„	Br.	w−1	12·9	
„ 25	93	300	„	Th.	=y	13·5	
„ 26	9794	T.150	„	Bn.	58−5	12·9	
Feb. 2	9801	300	2	Th.	z−1	13·9	
„ 8	07	240	1	Br.	w−4	13·2	
„ 25	24	200	„	„	w−4	13·2	
„ 27	26	300	„	Th.	=z	13·8	
Mar. 11	38	„	2	„	=y	13·5	Difficult.
„ 25	52	T.94	„	Bl.	<58	<12·4	
Apr. 4	62	300	„	Th.	=w	12·8	Very difficult.
„ 7	65	T.94	„	Bl.	=w	12·8	
„ 17	75	210	3	Th.	58−2	12·6	
„ 26	84	T.94	2	Bl.	56−2, 58+5·5	11·8	Difficult.
„ 28	86	120	1	Br.	=57	12·1	
May 11	9899	60	„	Gh.	=57	12·1	
„ 14	9902	T.94	„	Bl.	52−3, 57+5	11·6	
„ 16	04	155	2	Th.	52−2, 58+7	11·6	
„ 24	12	210	1	„	52−2, 58+7	11·6	
„ 25	13	120	„	Br.	52−1	11·5	
„ 25	13	60	„	Gh.	=52	11·4	
„ 26	14	T.94	„	Bl.	=43	10·5	
„ 30	18	60	„	Gh.	=52	11·4	
June 1	20	120	„	Th.	43−4, 52+4	10·9	
„ 4	23	„	„	Br.	30−4, 43+1	10·4	
„ 8	27	40	2	Gi.	=30	9·9	
„ 8	27	„	1	La.	30−1, 43+4·5	10·0	
„ 12	31	T.94	„	Bl.	=18	9·0	In t.22, 9·5.
„ 16	35	60	„	Gh.	=18, 21+5, 30+10	8·9	
„ 23	42	40	„	La.	15−2, 21+4	9·0	
„ 25	44	t.22	„	Bl.	11−1, 13+4	8·2	
„ 27	46	40	„	La.	=15, 21+5	8·9	
„ 29	48	30	„	Gh.	=16, =18	9·0	
July 11	60	37	„	Th.	9−1, 12+3	8·2	
„ 13	62	T.25	„	Bn.	9−1, 10+1, 12+2	8·1	
„ 13	62	50	„	Ma.	12+2	8·3	
„ 14	63	40	„	La.	9−2, 15+4	8·4	
„ 16	65	t.22	„	Bl.	=8	7·7	
„ 23	72	„	„	„	8−1, 11+3	7·8	
„ 25	74	50	„	Ma.	12+1	8·4	Ruddy.
„ 27	76	37	2	Th.	8−2·5, 9+1	8·0	Red.
„ 28	77	50	1	Ma.	12+2	8·3	
„ 29	78	T.25	„	Bn.	7−6, 9+2, 10+3	7·9	
Aug. 1	81	45	„	Br.	8−2	7·9	
„ 1	9981	50	2	Ma.	=9	8·2	

(8600) R CASSIOPEIÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Aug. 4	9984	37	1	Th.	=8	7·7	
,, 10	90	50	2	Ma.	6−10, 12+3·5	8·2	
,, 14	9994	t.22	1	Bl.	7−1·5, 8+2	7·5	
,, 24	0004	45	2	Br.	=8	7·7	About.
,, 27	07	37	1	Th.	8−6·5, 13+2	8·4	
,, 28	08	20	,,	La.	=15, 21+5	8·9	
Sept. 3	14	50	,,	Ma.	12+3, 18+5	8·4	Red.
,, 4	15	t.22	,,	Bl.	11−2, 13+3	8·3	
,, 6	17	T.25	,,	Bn.	7−6, 8−1, 9+1, 10+2	7·9	
,, 7	18	45	,,	Br.	=8	7·7	
,, 7	18	37	2	Th.	9−2, 12+2	8·3	
,, 8	19	90	1	Hw.	=13	8·6	
,, 8	19	50	2	Ma.	16+3, 17+2	8·7	Reddish.
,, 14	25	37	,,	Th.	8−6·5, 12+2, 13+2	8·4	
,, 24	35	45	1	Br.	8−5, 13+4	8·2	
,, 24	35	T.25	,,	Bn.	9−2·5, 12+1	8·4	
,, 24	35	20	,,	La.	15−3, 25+3	9·2	
,, 27	38	50	,,	Ma.	16+1, =18	8·9	Very red.
,, 27	38	t.22	,,	Bl.	11−1, 12+2·5	8·2	
,, 30	41	40	,,	Hw.	=16	8·9	
Oct. 5	46	,,	,,	La.	=21, 30+6	9·4	
,, 9	50	37	2	Th.	=13	8·6	
,, 14	55	,,	,,	,,	8−6·5, 13+2	8·4	
,, 17	58	45	1	Br.	13−1, 16+2	8·7	
,, 18	59	79	2	Ma.	=18	9·0	About. Reddish.
,, 21	62	40	1	La.	21−1, 30+5	9·5	
,, 22	63	90	2	Hw.	=18	9·0	
,, 25	66	t.22	1	Bl.	11−5, 16+3	8·6	
Nov. 1	73	45	,,	Br.	13−1, 16+2	8·7	
,, 1	73	40	,,	Hw.	=21	9·4	
,, 1	73	79	,,	Ma.	=18, 21+4	9·0	Deep red.
,, 5	77	37	,,	Th.	18−1, 25+4	9·1	
,, 7	79	79	,,	Ma.	18−2, 21+2	9·2	Deep red.
,, 12	84	62	2	Th.	15−2, =18, 21+3	9·0	
,, 13	85	t.22	1	Bl.	11−6, 16+2	8·7	
,, 18	90	40	,,	La.	21−6, =30	10·0	
,, 21	93	155	,,	Th.	21+1·5	9·3	
,, 22	94	160	,,	Br.	21−1, 30+4	9·5	
,, 22	94	120	,,	Th.	21−1	9·5	
,, 22	94	79	,,	Ma.	21−5, 43+5	10·0	Red.
,, 26	0098	40	2	La.	30−1	10·0	
,, 28	0100	T.50	1	Bn.	21−2, 26+1	9·6	
,, 29	01	90	2	Hw.	21−4, 30+1·5	9·8	
,, 29	01	40	,,	La.	30−1, 43+4	10·1	
Dec. 5	07	120	,,	Th.	21−3, 30+2	9·7	
,, 10	12	62	1	,,	30−1, 43+4	10·1	Very red.
,, 12	14	155	,,	,,	21−4, 30+1	9·8	
,, 16	18	62	,,	,,	30−2	10·1	
,, 18	20	T.95	,,	Bn.	36−0·5, 43+2	10·3	
,, 18	20	T.94	,,	Bl.	=21	9·4	
,, 18	20	79	,,	Ma.	52+1	11·3	
,, 20	0122	120	2	Th.	43−2, 51+2	10·7	

(8600) R CASSIOPEIÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1913.							
Dec. 21	0123	40	1	La.	51−3, 52+2	11·2	
,, 22	24	62	2	Th.	43+1	10·4	
,, 23	25	160	1	Br.	43−2, 52+6	10·7	
,, 28	30	145	,,	Th.	=36, 43+2	10·3	
,, 30	32	T.120	,,	Bn.	51+1	10·9	
1914.							
Jan. 3	36	T.95	,,	,,	=51	11·0	
,, 3	36	60	,,	Th.	36−1, 43+1	10·4	
,, 5	38	157	,,	,,	=43	10·5	Very red.
,, 5	38	T.94	2	Bl.	21−3, 30+3	9·7	
,, 6	39	120	1	Br.	52+4	11·0	
,, 17	50	T.94	2	Bl.	43−1, 51+4	10·6	
,, 22	55	145	,,	Th.	51−1, 53+1	11·1	
,, 23	56	120	1	Br.	52−2, 57+6	11·5	
,, 23	56	T.150	2	Bn.	52−4	11·8	
,, 26	59	T.120	1	,,	54−5, 57+2	11·9	
,, 26	59	157	2	Th.	52−2	11·6	Very red.
Feb. 1	65	145	1	,,	52+2	11·2	
,, 2	66	183	,,	Ma.	52−2	11·6	
,, 3	67	T.94	,,	Bl.	52−1, 56+2	11·4	
,, 4	68	157	2	Th.	=52	11·4	
,, 5	69	120	1	Br.	52−4, 57+4	11·7	
,, 10	74	220	2	Th.	52−5, 58+5	11·9	
,, 15	79	157	1	,,	52−2, 57+5·5	11·6	
,, 15	79	T.120	,,	Bn.	57−1, 58+1	12·3	
,, 18	82	157	,,	Th.	52−6, 57+2	11·9	
,, 18	82	183	,,	Ma.	52−5, 58+5	11·9	
,, 21	85	120	,,	Br.	=58	12·4	
Mar. 6	0198	183	,,	Ma.	58+2	12·2	
,, 10	0202	120	2	Br.	=58	12·4	About. Difficult.
,, 21	13	T.120	1	Bn.	57−1	12·2	
,, 22	14	120	,,	Br.	58−1, w+3	12·5	
Apr. 22	45	T.94	2	Bl.	52−6, 57+1	12·0	
,, 29	52	120	1	Br.	58+1	12·3	
May 2	55	T.94	2	Bl.	=52	11·4	
,, 16	69	120	,,	Gh.	=52	11·4	
,, 18	71	,,	,,	Br.	52−2	11·6	About. Difficult.
,, 18	71	T.94	1	Bl.	30−4, 43+1	10·4	
,, 21	74	120	,,	Gh.	=52	11·4	
June 5	89	T.94	,,	Bl.	30−1·5, 43+4	10·1	
,, 10	94	160	,,	Br.	43−3, 52+5	10·8	
,, 10	0294	114	,,	Th.	21−4, 30+1	9·8	
,, 17	0301	T.94	,,	Bl.	21−4, 30+2	9·8	
,, 19	03	157	2	Th.	32−2	10·2	
,, 21	05	160	1	Br.	30−3, 43+3	10·2	
,, 26	10	T.94	,,	Bl.	21−1, 30+5	9·5	In t.22, 10·0.
,, 28	12	183	,,	Ma.	52+3	11·1	Doubtful. [C.L.B.]
,, 29	13	160	,,	Br.	30−2	10·1	
,, 29	0313	157	2	Th.	21−1, 30+4	9·5	

(8600) R CASSIOPEIÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
July 4	0318	157	I	Th.	32+1	9·9	
,, 6	20	79	,,	Ma.	21−3, 30+3	9·7	Ruddy.
,, 9	23	T.94	,,	Bl.	16−4, 21+0·5	9·3	In t.22, 9·7.
,, 12	26	79	,,	Ma.	=21	9·4	Deep red.
,, 17	31	,,	,,	,,	21+1	9·3	Red.
,, 20	34	,,	,,	,,	21+2	9·2	Ruddy.
,, 27	41	183	2	,,	21+0·5	9·4	Reddish.
,, 30	44	60	,,	Th.	16+2	8·7	
Aug. 2	47	45	I	Br.	8−9, 13−1, 16+3	8·6	
,, 3	48	50	,,	Ma.	=16, =18	9·0	
,, 4	49	40	,,	Th.	12+2	8·3	
,, 12	57	,,	2	,,	8−3	8·0	
,, 17	62	,,	,,	,,	6−2	7·4	
,, 21	66	45	I	Br.	4−1, 6+1	7·1	
,, 25	70	40	2	Th.	=3	6·7	
,, 27	72	,,	I	,,	=1	6·3	
,, 28	73	T.25	,,	Bn.	3−0·5, 4+2	6·8	
Sept. 1	77	,,	,,	,,	=3, 4+2	6·7	
,, 10	86	40	2	Th.	1+4	5·9	
,, 11	87	45	,,	Br.	3+5, 6+10	6·2	Orange red.
,, 11	87	T.25	I	Bn.	1−1, 3+3	6·4	
,, 20	96	B.	,,	Br.	1+1	6·2	
,, 23	0399	40	,,	Hw.	4+4, 6+6	6·6	
,, 24	0400	60	2	Th.	1+4	5·9	
,, 25	01	B.	I	Br.	1+3	6·0	
,, 25	01	T.25	,,	Bn.	1+2	6·1	
,, 28	04	t.22	,,	Bl.	1+3	6·0	In B. 6·4.
,, 29	05	T.25	,,	Bn.	1+2	6·1	
,, 30	06	40	,,	Th.	=1	6·3	
Oct. 10	16	,,	2	,,	1+4	5·9	
,, 11	17	T.25	I	Bn.	1−2, 3+2	6·5	
,, 12	18	B.	,,	Br.	1+1	6·2	
,, 23	29	40	2	Th.	1+4	5·9	
,, 27	33	,,	I	Hw.	4+2, 6+4	6·8	
,, 27	33	t.22	,,	Bl.	1+4·5	5·8	
Nov. 3	40	40	2	Th.	1+3	6·0	
,, 3	40	,,	I	Hw.	4+2, 6+4	6·8	
,, 5	42	t.22	,,	Bl.	1+2·5	6·0	
,, 7	44	B.	,,	Br.	1−2, 3+2	6·5	
,, 7	44	40	,,	Th.	3+2	6·5	
,, 12	49	,,	,,	Hw.	4+0·5, 6+4	6·9	
,, 16	53	T.25	,,	Bn.	3−2, 6+2	6·9	Very red.
,, 16	53	t.22	,,	Bl.	1−1, 2+3	6·4	
,, 18	55	T.25	,,	Bn.	3−1, 4+2	6·8	
,, 19	56	60	2	Th.	6+4	6·8	
,, 20	57	40	,,	,,	3−1	6·8	
,, 21	58	t.22	I	Bl.	2−1, 4+2	6·8	
,, 23	60	40	,,	Th.	6+4	6·8	
,, 25	62	,,	,,	Hw.	=4	7·0	
,, 27	0464	60	,,	Br.	4−1, 6+1	7·1	

(8600) R CASSIOPEIÆ—*continued.*

Date.	Julian Date.	Inst.	Class.	Observer.	Comparisons.	Deduced Mag.	Remarks.
1914.							
Dec. 1	0468	40	2	Th.	=6	7·2	
,, 5	72	T.50	1	Bn.	6−1, =7	7·3	
,, 5	72	40	,,	Hw.	6−4, 8+1	7·6	
,, 6	73	,,	,,	Th.	6−3	7·5	
,, 13	80	60	,,	Br.	6−3, 8+3	7·4	
,, 20	87	40	,,	Th.	9−3	8·5	
,, 21	88	,,	2	Hw.	8−6·5, 13+3	8·3	
,, 22	89	t.22	1	Bl.	8−1, 10+2	7·8	
,, 25	92	,,	,,	,,	8−2, =10	8·0	
,, 30	97	,,	,,	,,	10−1, 13+4	8·2	
,, 31	0498	45	,,	Br.	8−3, 13+6	8·0	

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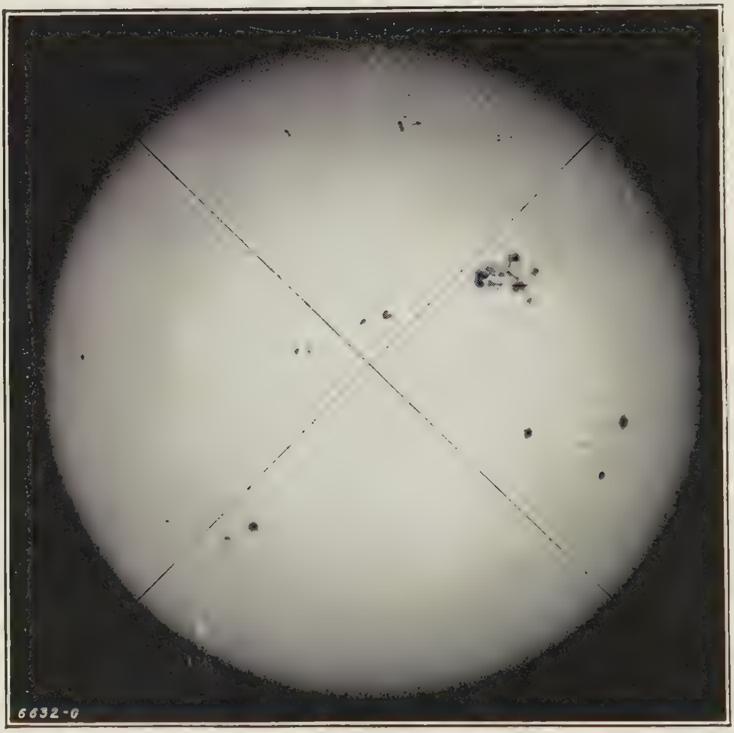

PHOTOGRAPH OF THE SUN.

Taken at Greenwich 1917 August $12^d\ 7^h\ 54^m\ 8^s$; Greenwich Civil Time.

During the apparition of the second giant spot-group of 1917—*see* p. 32—the Sun showed a larger total spotted area than at any other time during the last forty-eight years.

Note the pair of spider-lines crossing the Sun's disc at right angles to each other. *See* p. 47.

Frontispiece.

Memoirs

OF THE

British Astronomical Association.

EDITED BY

A. S. D. MAUNDER, F.R.A.S.

REPORTS

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1921.

CONTENTS.

SECTION FOR THE OBSERVATION

OF

AURORÆ AND THE ZODIACAL LIGHT.

DIRECTOR.—GAVIN J. BURNS, B.Sc.

SECOND REPORT OF THE SECTION, 1916-19.

INTRODUCTION.

After the publication of the first report in 1913, the work of the Section was recorded for three years (1913–15) in a series of reports that appeared from time to time in the *Journal.* Since the end of 1915 no detailed report has been published. The present report deals with observations made from the beginning of 1916 to the middle of 1919.

As the work of the Section comes to a standstill in the summer months, it has been considered that midsummer would be a better time to conclude the report than the end of the year.

AURORÆ.

The first report of the Section deals with Observations made in 1910–12. (*Memoirs*, Vol. XIX., p. 43).

Observations made in 1913 are recorded in the *Journal*, Vol. XXIV., p. 199.

Observations made in 1914 are recorded in Vol. XXV., p. 175.

Observations made in 1915 are recorded in Vol. XXV., p. 374 and XXVI., p. 146.

The Observers.

The following table gives the names of those Members of the Association who have contributed regular observations, together with the places where the observations were made :—

Name.	Locality.	Latitude.	Longitude.
		° ′	° ′
Backhouse, T. W. - -	Sunderland -	54 55 N.	1 22 W.
	Great Ayton -	54 30 N.	1 9 W.
Clark, J. E. - - -	Purley - -	51 19 N.	0 5 W.
Cook, A. Grace (Miss) - -	Stowmarket -	52 12 N.	1 E.
Denning, W. F. - - -	Bristol - -	51 26 N.	2 37 W.
Glanville, W. E. (Dr.) - -	Solomons, Maryland.	38 19 N.	76 27 W.
Henderson, Alex. C. (Rev.) -	Buckie - -	57 40 N.	3 W.
	Invergordon -	57 42 N.	4 11 W.
	Forfar - -	56 38 N.	2 53 W.
Johnson, Anthony (J.) -	Haroldswick, Shetland.	60 48 N.	0 49 W.
Stevenson, E. A. (Miss) -	Johnshaven -	56 47 N.	2 20 W.
	Glamis - -	56 36 N.	2 59 W.
Williamson, Wilfred - -	Scalloway, Shetland.	60 8 N.	1 12 W.

All observations made between the 7th of October, 1915, and April, 1919, are summarised in the following table. Each line in the table corresponds to a synodic rotation of the Sun. Carrington's mean rotation period of the Sun is adopted, together with the numeration of the rotations. Rotation 830 begins with 1915 October 7 :—

N denotes an observation made in Shetland.
S " " " " " Scotland.
E " " " " " England.
A " " " " " N, S and E.
B " " " " " N and S.
C " " " " " N and E.
D " " " " " S and E.
M " " " " " Maryland.
* " the first day of the month.

The table clearly shows the connection that exists between auroræ and the rotation of the Sun.

No. of Rotation.	Rotation begins.	Days from beginning of Rotation. 1 2 3 4 5 6 7	8 9 10 11 12 13 14	15 16 17 18 19 20 21	22 23 24 25 26 27 28
	1915				
830	Oct. 7	. N . . . N .	N C	. . . N N . .	. . . . C *
1	Nov. 3	. . N S B N A	. . . .	. . . .	. . . .
2	Dec. 1	N . . . A .	N N N N . . .	N	. . . .
3	Dec. 28	. . . N * . N	N B N . . . N	C	. . . . . N .

No. of Rotation.	Rotation begins.	Days from beginning of Rotation.			
		1 2 3 4 5 6 7	8 9 10 11 12 13 14	15 16 17 18 19 20 21	22 23 24 25 26 27 28
	1916				
4	Jan. 24	. N N N N S .	S * N B B N .	. N	. . . .
5	Feb. 21	. . N . . N S	. . * . S . N	N . . S . . .	. . . .
6	Mar. 19	. . . . . . E	. . . N . . *	. . . .	. . . .
7	Ap. 15	. . . . . N N	N . . O . . .	N . *	. . . .
8	May 12	. . . .	. . M	. . . . . . *	. . . .
9	June 9	. . . .	. . . .	. . . .	. * . . . .
840	July 6	. . . .	. . . .	. . . .	. . . . . . *
1	Aug. 2	. . . .	. . . .	. . . .	. . . E . .
2	Aug. 29	. N . E* N . S	. . . .	. . . .	. . . E S S .
3	Sep. 26	S . . . N * S	. . . .	. . . . N . .	. . . . . . S
4	Oct. 23	S S . . B . N	. N * N . N .	. . . .	. . . . N N
5	Nov. 19	N O S S . S S	. E . B N N* .	. . . .	. . . . . N N
6	Dec. 17	. S A C D A A	S D S . S . .	. * . . B N .	. . . . . .
	1917				
7	Jan. 13	. S S S . . N	N N B N . . .	. . . . . * .	S . . . . . .
8	Feb. 9	. . . S S B B	B	. . . . . . *	. . . .
9	Mar. 9	S S	. . . S B N .	. . . .	. . * . . .
850	Ap. 5	. . . . . S .	. . . . S . .	S	. . . . . . *
1	May 2	. . . .	. . . .	. . . .	. . . . E .
2	" 29	. . . * . . .	. . . .	. . . .	. . . . . .
3	June 25	. . . . . . *	. . . .	. . . .	. . . .
4	July 23	. . . .	. . *	. . . B . . .	E E S S S .
5	Aug. 19	. S D N . . E	. . . . . . *	. . . . . N .	. . . . S S
6	Sep. 15	. N N N . S .	. . . . . . S	. . *	. . . . . .
7	Oct. 12	. D . . . S S	. . S	. . N . . . *	. . . . . S .
8	Nov. 9	S S . N N . .	. . . . . N .	. . . .	. * . . . D
9	Dec. 6	. D . S . S D	S A . A B . .	. . . . . S .	. . . . . *
	1918				
860	Jan. 2	. . N N S . .	B S . S D S .	. . . .	. . . .
1	" 30	. N N* N . . .	B . B A S S N	B	. . . . . .
2	Feb. 26	. S S C* N . .	. . A A E . .	S S	. . . . . .
3	Mar. 25	. . . .	* . N C S D S	. . . B S C .	. . . .
4	Apl. 22	. . . S S . .	. . *	. . . .	. . . E . .
5	May 19	. . . .	. . . . . . *	. . . .	. . . . . .
6	June 15	. . . .	. . . .	. . ■ . . S .	S . . . . . .
7	July 12	. . . .	. . . .	. . . . . . *	. . . . . .
8	Aug. 9	S	. . . . . . S	. . . .	S N N* N . .
9	Sept. 5	S S	. . . . N . .	. . . . N N .	. E F . N ■

No. of Rotation.	Rotation begins.	Days from beginning of Rotation.			
		1 2 3 4 5 6 7	8 9 10 11 12 13 14	15 16 17 18 19 20 21	22 23 24 25 26 27 28
	1918				
870	Oct. 2	. . . C C C A	. . . .	. . . .	. . . . . N N
1	„ 29	. . . * . N N	N N	. . . N N . .	. . . . N . .
2	Nov. 26	. . . A N N* .	N N B S N N N	. . . .	. . N N . .
3	Dec. 23	. N C N . . .	. N* . . B B N	S N	. . . N . N
	1919				
4	Jan. 19	N N	N . N N S . *	. . S	. . . .
5	Feb. 16	. . . N N N	S . N . A N *	B . . . . N .	. . N . . .
6	Mar. 15	. . . . N N N	N N	N N . * . . .	. . . . . .
7	Apl. 11	. . . . N . E	. . . . N N N	N . . . . . *	. . . .

Auroræ of exceptional brilliancy were seen on the following dates :—

1915 Oct. 14. Seen also in British Columbia. *See Journal*, XXVI., 148.

Oct. 15. *See Journal*, XXVI., 146.

1916 April 25.

1917 Feb. 15. Brightest display this season at Haroldswick.

Aug. 9. Seen all over the south of England. An aurora australis was seen 12 hours earlier. On the 10th of Aug. a large sunspot crossed the sun's central meridian.

Dec. 16. Seen also in Ireland, where it was the most vivid for a number of years.

1919 Jan. 4 and 16.

March 20.

During 1917–18 and 1918–19 there was scarcely a single dark night at Haroldswick.

THE ZODIACAL LIGHT.

The following Report deals with observations from the beginning of 1916 to April 1919, and a few additional observations made in 1913–15.

As very few observations of the Zodiacal Light are obtained in the summer, it has been found convenient to divide the records into periods, each period ending at midsummer. The letter E. is used to denote the elongation or distance of the apex from the Sun. Z.B. denotes the zodiacal band.

The Observers.

The following table gives the names of those members of the Association who have contributed regular observations, together with the places where the observations were made :—

Name.	Locality,	Latitude.	Longitude.
Brown, B. [B.B.] - - -	Rickinghall, near Diss.	52° 24′ N.	1° 7′ E.
Carpenter, Alfred (Capt.) [A.C.]. - - - -	Budleigh Salterton.	50 38 N.	3 20 W.
	Sanderstead -	51 20 N.	0 4 W.
Clark, J. E. [J.E.C.] - -	Purley - -	51 19 N.	0 5 W.
Freeman, Louisa P. (Mrs.) [F.]. - - - -	Abingdon -	51 40 N.	1 17 W.
Glanville, W. E. (Dr.) [G.]. -	Solomons, Maryland.	38 19 N.	76 27 W.
Henderson, Alex. C. (Rev.) [A.H.]. - - - -	Buckie.	57 40 N.	3 W.
Markwick, E. E. (Col.) [E.E.M.] - - - -	Dublin.	53 20 N.	6 15 W.
Mattey, Sidney B. [S.B.M.]-	Longfield, Kent.	51 24 N.	0 18 E.
Molesworth, F. C. (Major) [M.] - - - - -	Delhi.	28 40 N.	77 15 E.
	Mesopotamia.		
	Persian Gulf.		
	Basrah.	30 32 N.	47 52 E.
	Qurnah.	31 0 N.	47 25 E.
	Amarah.	31 55 N.	47 5 E.
Phillips, T. E. R. (Rev.) [P.].	Epsom.	51 20 N.	0 17 W.
Steavenson, W. H. (Dr.) [W.H.S.]. - - -	Norwood.	51 26 N.	0 3 W.
Stevenson, E. A. (Miss) [E.A.S.] - - - -	Johnshaven.	56 47 N.	2 20 W.
Stephanides, Th. [T.S.] -	Salonica.	40 40 N.	23 E.
Thom, Alexander [T.]. -	Dunlop.	55 44 N.	4 32 W.
Williamson, Wilfred, [W.W.].	Scalloway, Shetland.	60 8 N.	1 12 W.
Wilson, Fiammetta (Mrs.) [F.W.]. - - - -	Totteridge.	51 8 N.	0 11 W.
Warren, J. [W.]. - - -	Robben Island.	33 45 N.	18 30 E.
	Cape Town.	34 S.	18 33 E.

Besides the Members mentioned above, Mr. Naragana Ayyar [A.] has contributed a number of observations made at Kodaikanal Observatory, Lat. 10° 14′ N., 77° 29′ E.

Observations in 1911 and 1912 will be found recorded in the last Report of the Section, Memoirs, XIX., p. 41.

Observations in 1913 will be found in the Interim Reports of the *Journal*, XXIII., p. 379, and XXIV., p. 203.

Observations in 1914 will be found in the Interim Reports in the *Journal*, XXIV., p. 441, and XXV., p. 179.

Observations in 1915 will be found in the Interim Reports in the *Journal*, XXV., p. 379, and XXVI., p. 186.

1913–14.

A number of observations, made by Mr. J. Warren at Robben Island near Cape Town, and not previously recorded, are given below :—

1913 March 8, 9, 11, 16, 17, 18, 21, 23. Seen about 5 a.m. Altitude, 44° to 45°. Width at base, 6° to 9°. Colour, faint yellow.

April 4, 5, 6, 9, 10, 11, 13. Seen from 5 to 6 a.m. Altitude, 25° to 40°. Width, 5° to 9°. Light yellow.

August 3, 4. Seen between 7.25 and 9 p.m. Light gray.

August 21, 22, 23, 24, 29, 30. Seen between 7 p.m. and 9.15 p.m. Light gray or yellowish.

September 21, 22, 23, 24, 29, 30. Seen between 7.30 and 9.30 p.m. Light gray.

October 1 and 27. Seen between 8.15 and 9.15 p.m. Light gray.

The sketches show the apex about 60° from the Sun in the preceding evening observations.

1914, Feb. 25, 26, 27, 28 ; March 1, 3, 5, 6, 8, 9. Seen between 4.40 and 5.55 a.m.

March 27, 30, 31. Seen between 5.00 and 6.15 a.m.

April 3, 5. Seen between 4.40 and 5.30 a.m.

April 26. Seen from 4.50 and 6.15 a.m.

May 4, 5, 6, 7, 21, 22, 23, 29. Seen between 4.50 and 6.20 a.m.

In all the observations made in 1914 the colour was light gray. The sketches show the apex about 50° from the Sun.

1915–16.

1915, July 2, 6, 9, 21. Seen between 7.30 and 9.10 p.m.

August 10, 26, 27, 28, 29. Seen between 7.00 and 9.30 p.m.

Sept. 9, 10, 11. Seen between 7.15 and 9.30 p.m.

Sept. 28, 29. Seen between 8.00 to 9.50 p.m.

Oct. 3, 4, 7, 8. Seen between 8.00 and 10.00 p.m.

Nov. 26. 27, 28, 29. Seen between 8.00 and 10.00 p.m.

Dec. 4, 6, 7, 27, 28, 31. Seen about 9.30 p.m.

All the observations made in 1915 show the light as extending about 60° from the Sun. The colour was light gray.

Observations were recorded on the following dates between January and midsummer :—

1916 Jan. 1, 4, 5, 6, 7*, 8, 22, 23, 24, 25, 26, 27, 28, 29.

Feb. 1, 2, 3, 4, 5, 21, 22, 23, 24, 26, 27, 28, 29.

March 1, 2, 3*, 4*, 5*, 6*, 7*, 8*, 9*, 10*, 11*, 12*, 15*, 16*, 17*, 21, 23, 24, 25, 26, 30*, 31*.

April 1, 2*, 3*, 4*, 5*, 6*, 7*, 8*, 9*, 10*, 11*, 12*, 13*, 14*, 15*, 20, 21, 22, 23, 24, 25.

May 24, 30, 31.

Morning observations were made on the dates marked *.

Details of the Observations.

1916 Jan 5. Apex 20° beyond Jupiter. E. =87°.

Jan. 6. Apex 20° beyond Jupiter. E. = 87°. M.

Jan. 7. 3.30 a.m. Apex about β Leonis. E. = 117°. Moon 2 days old.

Jan. 7. 6.30 p.m. Apex 15° beyond Jupiter. E = 79°.

Jan. 8. Apex 15° beyond Jupiter. E. = 78°.

Jan. 23. Apex at Pleiades. 20° broad at base. E = 115°. M.

Jan. 23. Brightest part on ψ_1 Aquarii and a little south of α Piscium. A.

Jan. 24. Brightest part on ψ_1 Aquarii and a little north of α Piscium. A.

Jan. 25. Apex about 5° short of Pleiades. E. = 108°. M.

Jan. 25. Brightest part on ψ_3 Aquarii, half way between ω Piscium and ι Ceti; and a little north of ξ_2 Ceti. A.

Jan. 26. Apex about 5° short of Pleiades. E, = 108°. M.

Jan. 26. Brightest part south of ψ_3 Aquarii, north of 30 Piscium, between ν and ζ Piscium, and a little more than one-third of the distance from ξ_2 Ceti and γ Arietis. A.

Jan. 27. Apex at Pleiades. E, = 111°. M.

Jan. 27. Brightest part 2° south of ψ_3 Aquarii, on 30 Piscium, μ Piscium, and one-third of distance from ξ_1 Ceti and γ Arietis.

Jan. 28. Brightest part 3° south of ψ_3 Aquarii, half way between 30 and 27 Piscium, on 89 Piscium, μ Piscium and then as last obs.

Jan. 29. Brightest part 3° south of ψ_3 Aquarii, otherwise the same as last night. A.

Jan. 30. Apex at Pleiades. M.

Jan. 30. Brightest part about 4° south of ψ_3 Aquarii, on 30 Piscium, 20 Ceti, ν Piscium, and 2° north of ξ_1 Ceti.

Jan. 31. Brightest part on ψ_3 Aquarii, 29 Piscium, between 89 and ζ Piscium, and halfway between ξ_2 Ceti and γ Arietis. A .

Feb. 1. Apex 5° short of Pleiades. E. = 101°. M.

Feb. 1. Brightest part on 27 Piscium, halfway between 89 and ζ Piscium, halfway between π and o Piscium, and halfway between ξ_2 Ceti and γ Arietis. A.

Feb. 2. Apex 5° short of Pleiades. M.

Feb. 2. Brightest part 1° north of 89 Piscium, on o Piscium, and halfway between ξ_1 Ceti and γ Arietis, and on δ Arietis. A.

Feb. 3. Apex at Pleiades. E. = 104°.

Feb. 4. Apex at Pleiades. E. = 104°.

Feb. 5. Apex 5° short of Pleiades. E. = 97°. M.

Feb. 5. Apex between π and o Piscium. E. = 70°. F.W.

Feb. 5. The sky was extraordinarily transparent. I happened to be down at Ashtead in the early part of the evening, and it was there that I first saw the light and saw it best. The apex reached as far as the line between η and o Piscium, rather nearer the latter [E. = 70°]. Light was about 20° broad at base, and tapered towards apex. From the apex there was a faint band-like extension, 8° or so in diameter, which I could trace as far as 4^h of R.A. to between Aldebaran and the Pleiades.

The cone itself was about as bright as M.W. in Cygnus, but the band was very much fainter, about half as bright as M.W. in Monoceros. Such parts as had not set were just as easily visible at 10 and even at 11 p.m. W.H.S.

Feb. 21. Apex below Pleiades. Brighter than Milky Way in Cepheus. F.

Feb. 21. Sunset, $5^h\ 47^m$. At 7 p.m. sky perfectly clear, the Z.L. was bright and strong and plainly traceable as far as the Hyades, thereby making its apex at least 90° from the Sun. The axis of brightness of the light was fairly symmetrical, though in the direction of α and β Arietis. It seemed to be bent a little to the northward, due perhaps to the angle of incidence of the sunlight. G.

Feb. 22. Apex at Pleiades. E = 85°. Hazy. M.

Feb. 22. Apex very near Pleiades, N. side especially bright and well defined. Brightest between η and α Piscium, more intense than Milky Way in Cepheus. E = 85°. F.W.

Feb. 23. Apex 5° beyond Pleiades. E = 89°. Hazy.
Feb. 24. Apex 5° beyond Pleiades.
Feb. 26. Apex 3° beyond Pleiades. E = 84°.
March 1. Apex 3° beyond Pleiades. E = 80°. M.
March 1. Apex near Pleiades. Brighter than Milky Way. A.C.
March 2. Apex at Pleiades. E = 76°. Slight haze.
March 3. Apex 5° beyond Pleiades. E = 80°. M.
March 3. Apex a little above and beyond the Pleiades. F.
March 4. Long. of apex 57°. [E = 73°]. Fainter than Milky Way. Colour, an extremely pale yellow.
March 5. Long. of apex 54°. [E = 71°]. F.W.

March 21. End merged in Milky Way.

March 23. Apex merged in Milky Way. Z.B. visible as far as Virgo = 180° from Sun.

March 25. As on 23rd. M.

March 26. Very bright, especially at Pleiades. Brighter than Milky Way. F.

March 30. End merged in Milky Way. Z.B. visible right across sky.

April 4. As on 30th March.

April 20. Apex about Gemini. [E = 70°]. Z.B. faintly visible.

April 21.	,,	,,	,,	,,	,,
April 22.	,,	,,	,,	,,	,,
April 23.	,,	,,	,,	,,	,,
April 24.	,,	,,	,,	,,	,,
April 25.	,,	,,	,,	,,	Traces of Z.B.

May 24. Apex about Regulus. E = 85°. Slight haze.
May 30. Apex about Regulus. Z.B. visible as far as Scorpio. [Nearly across the sky.]

May 31. Apex about Regulus. M.

1916–17.

Observations were recorded on the following dates :—

June 10*, 14*, 15*.
July 4*, 9*, 10*, 12*, 21, 22, 23, 24, 25, 26.
Sept. 14, 15, 20, 21, 22, 23, 25, 26.
Oct. 7*, 9, 19, 21, 24, 25, 26, 27, 29.
Nov. 1, 2*, 3, 4, 5, 6, 13, 19, 20, 25, 26.
Dec. 5, 14, 26.
Jan. 14, 16, 18, 25, 27.
Feb. 9, 10, 12, 15, 17, 19, 21.
March 10, 11, 12, 13, 15, 16, 19, 20, 21, 22, 23, 25, 28, 29.
April 9, 10, 11, 12, 14, 15, 16, 19, 22.
Morning observations are recorded on dates marked *.

Details of the Observations.

1916 Oct. 7, 3.45 a.m. Z.L. easily discerned, extending along the ecliptic and ending between Leo and Cancer, say 30° from the horizon. Its breadth on the horizon was about 20°, this being the broadest part. Two-thirds of its transverse extent was N. of the ecliptic. Brightness equal to that of Galaxy between Canis Minor and Orion. 4.30, light extended into Cancer ; its end was distinctly seen as a cone. By this time the light extended about 82° from the Sun. The extension came on rapidly. 4.45, dawn began. 6·01, sunrise.

Oct. 9. Appearance generally the same as on Oct. 7.

Oct. 26. The Z.B. was seen in the west, extending from and through Scorpio and across the gaps in the Galaxy.

Oct. 27. General appearance the same as last evening.

Oct. 29. General appearance the same as on 26th and 27th.

Nov. 1. Moon six days old ; set at 10.25 p.m. At 9.30, sky perfectly clear, the zodiacal band was seen girdling the ecliptic from E. to W. Boundaries were well defined, about 7° in extent. Light was of uniform breadth until about 20° above each horizon, when it was lost in the luminosity of the Galaxy in the E. and the Moon's luminosity in the W.

Nov. 2, 4.45. a.m. Z.L. stronger towards the eastern horizon. Vertex near Præsepe. (E = 95°.) To Regulus the light was strong ; from Regulus to Cancer, fainter. Main body of the light was N. of ecliptic, but bending towards ecliptic from Regulus. Sunrise, 6.35.

Nov. 19. Sunset 4.45. At 8.30 the zodiacal band was distinctly seen skirting the ecliptic from Capricornus through Taurus to Galaxy in E. The Z.B. was very filmy in appearance, but quite distinct. G.

Dec. 5. Apex about long. 165°, lat. 4° S. [E = 88°] F.W.

1917 Jan. 14. Sunset 4.50. 6.30 p.m., Z.L. north-west of Fomalhaut, apex about 12° west of Jupiter. E = 82°. Brightness fairly equal to Milky Way.

Jan. 16. Sunset 5.00. Configuration practically same as last observation. 7.00 p.m., brightness equal to Cygnus asterism.

Jan. 18. Sunset 5.07. 7.15 to 7.30 p.m., brightness equal to M.W. in Cygnus. Cone of light reached nearly to Jupiter. (E. about 80°.) G.

Feb. 9. Exceptionally bright. W. margin quite sharply defined. E. = 70°. J.E.C.

Feb. 10. Sunset 5.26 (Moon full Feb. 6). 7.30 p.m., Z.L. showed up well, reaching to Jupiter in Aries. E. = 69°. The general luminosity of the Z.L. was bold, and distinctly north of ecliptic.

Feb. 17. Discernible a little beyond Jupiter (E about 60°). Main bulk of brightness, about half-way between Jupiter and horizon, distinctly brighter than M.W. G.

Feb. 19. Apex 5° W. by S. of Jupiter. E. = 59°. A.H.

Feb. 21. Could be traced about 6° east of Jupiter. E. = 67°.

March 10. Brighter than galaxy in N.W., and extending beyond Aries towards Taurus. G.

March 13. Terminated near Pleiades. E. = 66°. E.E.M.

March 15. Apex between Hyades and Pleiades. E. = 62°.

March 20. Strong to Pleiades, and perhaps to Milky Way.

March 22. Glow very pronounced to Pleiades. S. line of boundary very straight and close to ecliptic. G.

March 23. Brighter than M.W. E. = 44°. F.W.

March 25. Plainly visible beyond the Pleiades at 7.45 p.m. Major part north of the ecliptic. Moon 3 days old. Sunset 6.05.

March 28. Plainly visible between the Moon and the horizon. Moon 6 days old. G.

April 12. Axis of greatest light roughly on the ecliptic.

April 14. Pleiades in the glow, and it might have gone up to β Tauri. E. = 57°. E.E.M.

April 14. Visible to a point about one-third of the distance between the Galaxy and Saturn. E. = 80°. Faint Z.B. reaching from Regulus to N. of Spica.

April 16. Could be traced from East of Aries towards Gemini. [E. about 79°]. Luminosity much fainter than a month ago. G.

April 19. The Pleiades seemed possibly a trifle to the north of the central line. It stretched up to the vicinity of β Tauri. [E. = 50°]. Perhaps it could be glimpsed to a point between Capella and the middle of the Constellation Gemini. [About 20° further from the Sun]. E.E.M.

1917-18.

Observations were recorded on the following dates :—

1917 July 21, 22*.
Aug. 7, 8, 9, 10, 14.
Sept. 3, 4, 6, 8, 9, 10, 11, 17.
Dec. 2, 3, 4, 5, 6, 8, 10, 11, 12, 13, 14, 15, 16.
1918 Jan. 1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 28, 29, 30, 31.
Feb. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 15, 16, 17, 18, 27, 28.
March 1, 2, 3, 8, 9, 10, 11, 12, 18, 19, 20, 23, 29, 30.
April 1, 2, 3, 5, 25, 26, 27, 28.
Morning observations are recorded on dates marked.*

Details of the Observations.

1917 July 21. E = 70°; 2^h 18^m after sunset.
July 22. E = 78°; 1^h 46^m before sunrise.
Aug. 7. E = 62°; 2^h 1^m after sunset.
Aug. 8. E = 62°; 2^h 20^m after sunset.
Aug. 9. E = 62°; 2^h after sunset.
Aug. 10. E = 61°; 1^h 49^m after sunset.
Aug. 14. E = 58°; 1^h 36^m " "
Sept. 3. E = 60°; 1^h 57^m " "
Sept. 4. E = 61°; 1^h 57^m " "
Sept. 6. E = 60°; 1^h 55^m " "
Sept. 8. E = 58°; 1^h 49^m " "
Sept. 9. E = 62°; 2^h 8^m " "
Sept. 10. E = 63°; 1^h 57^m " "
Sept. 17. E = 62°; 1^h 43^m " "

The width of the light at the horizon varied from 28° to 33° in the last 14 observations. W.

Sept. 17. Apex was level with Castor and Pollux and some 5° to the right. E = 52°. J.E.C.

Dec. 2. E = 81°. Not quite so bright as M.W.
Dec. 3. E = 81°. Not quite so bright as M.W.
Dec. 4. E = 93°. Fainter.
Dec. 5. E = 105°. Boundary ill-defined and faint.
Dec. 6. E = 104°. " " " "
Dec. 8. E = 89°. Very faint. Slight haze.
Dec. 10. E = 100°. About half as bright as nearest part of Milky Way.
Dec. 11. E = 99°. As on 10th.
Dec. 12. E = 98°.
Dec. 13. E = 97°.
Dec. 14. E = 108°.
Dec. 15. E = 107°.
Dec. 16. E = 107°. Very faint.
1918 Jan. 1. E = 100°. About half M.W.
Jan. 2. E = 131°.
Jan. 3. E = 130°. About $\frac{3}{4}$ M.W. 20° broad.
Jan. 4. E = 112°.
Jan. 5. E = 125°.
Jan. 7. E = 84°. Hazy.
Jan. 8. E = 93°. Slightly hazy.
Jan. 10. E = 101°. " "
Jan. 11. E = 100°. " "
Jan. 12. E = 95°. " "
Jan. 13. E = 98°. " "
Jan. 14. E = 119°.
Jan. 15. E = 92°. Moon 3 days old.
Jan. 16. E = 95°.
Jan. 28. E = 83°. Brighter than M.W. Moon just rising.
Jan. 29. E = 109°. Nearly twice as bright as M.W.
Jan. 30. E = 103°. " " " "
Jan. 31. E = 107°. M.
Jan. 31. North boundary of Z.L. about 2° south of the line.

η Piscium, α Pegasi, and γ Pegasi. Apex at long. 26°, lat. 5° N. (E = 75°). Brightest part a good deal brighter than M.W. Width at horizon 45°. A.C.

Feb. 1. E = 106°. M.

Feb. 1. Apex at long. 32°, lat. 3° N. (E = 80°). Brightest part much brighter than Milky Way. Width at horizon 45°. A.C.

Feb. 1. Brightness of cone estimated to be 2 or 3 times that of M.W. in Cygnus. Apex near ϵ Piscium (E = 64°), though a faint extension, 8° or 10° broad, could be traced as far as the Pleiades. W.H.S.

Feb. 2. E = 105°.

Feb. 3. E = 104°.

Feb. 4. E = 103°.

Feb. 5. E = 104°. M.

Feb. 5. E = 84°. T.S.

Feb. 6. E = 91°. Hazy.

Feb. 7. E = 100°.

Feb. 8. E = 94°. Slight haze. M.

Feb. 8. Apex at long. 29°, lat. 1° N. (E = 70°). Brightest part brighter than M.W. Width at horizon 37°. A.C.

Feb. 9. E = 100°. M.

Feb. 10. Apex of principal cone 77° from the Sun, of secondary cone 99°. Central line of these cones sensibly on the ecliptic. There was a faint glow extending for several degrees on the north side of the cone. T.S.

Feb. 12. E = 97°. $1\frac{1}{2}$ to twice as bright as M.W.

Feb. 13. E = 94°. Moon two days old. M.

March 1. Apex as near the Pleiades as T Arietis (E = 72°). Distinctly brighter than the M.W. in Perseus. F.W.

March 1. Apex at long. 62°, lat. 9° N. Not a very clear observation. Width at horizon, 45°. A.C.

March 2. Apex in M.W. Z.B. across sky.

March 3. " " " "

March 8. Apex in M.W., Z.B. across sky. M.

March 8. Apex at long. 29°, lat. 1° (E. = 70°). Brightest part brighter than M.W. Width at horizon 37°. A.C.

March 9. Level with Pleiades (E. = 68°). Main mass distinctly brighter than any part of M.W. J.E.C.

March 9. Apex at long. 63°, lat. 8° N. Rather brighter than M.W. Width at horizon 22°. A.C.

March 10. Apex in M.W. Z.B. across sky. M.

March 12. Apex near 14 and 13 Tauri (E = 68°). Considerably brighter than M.W. in Gemini and Monoceros; the brightest portion between γ Arietis and ξ_2 Ceti. (This would be about 40° from the Sun). F.W.

March 18. E = $78\frac{1}{2}$°.

March 19. E = $77\frac{1}{2}$°. M.

March 30. Apex at long. 63°, lat. 18° N. Very little brighter than surrounding sky. A.C.

April 1. Pleiades seemed roughly on the axis, which was directed upwards towards a point somewhere between β Tauri an ι Aurigæ, but boundaries very diffuse and difficult. This estimate places the axis some 5° N. of ecliptic.

April 2. Axis appeared more or less coincident with ecliptic. The intensity at the lower part of the axis quite equal to that of the M.W. E.E.M.

April 2. Apex as on March 30. Very bad definition.

April 5, Apex at long. 58°, lat. 13° N., badly defined. A.C.

1918–19.

Observations were recorded on the following dates :—

Sept. 7.
Nov. 3, 4, 5, 6, 13*, 21, 22, 23, 30.
Dec. 2, 3, 4, 20, 21, 22, 23, 25, 27, 30.
1919 Jan. 3, 5, 6, 20, 24, 25, 26, 27, 28, 30, 31.
Feb. 3, 4, 18, 21, 22, 24, 25, 26, 27, 28.
March 1, 2, 3, 4, 5, 6, 19, 22, 23, 24, 25.
April 1, 20, 21, 24.
Morning observations were recorded on date marked*.

Details of the Observations.

1918 Nov. 3. Z.B. visible right across sky.
Nov. 4. " " "
Nov. 5. " " " Breadth at base about 15°.
Nov. 6. E = 116°.
Nov. 13. E = 81°.
Nov. 21. E = 101°. Z.B. visible across sky.
Nov. 22. E = 100°. " "
Nov. 23. E = 99°. Z.B. very faintly visible.
Nov. 30. E = 102°.
Dec. 2. E = 113°.
Dec. 3. E = 89°.
Dec. 4. E = 88°.
Dec. 20. E = 102°.
Dec. 21. E = 101°.
Dec. 22. E = 100°.
Dec. 27. E = 107°.
Dec. 30. E = 104°.
1919 Jan. 3. E = 87°.
Jan. 5. E = 85°.
Jan. 6. Faintly visible S. of Pegasus.
Jan. 20. E = 82°. Slight haze. M.
Jan. 24. E = 83°; lat. 2° N. Width at horizon 35°.
Jan. 27. E = 77°; lat. 2° N. Width 35°. Brighter than M.W. between Cassiopeia and Cygnus. A.C.
Jan. 27. E = 108°.
Jan. 28. E = 107°.
Jan. 30. E = 99°. Slight haze.
Feb. 3. E = 68°. Moon 3 days old. 6.30 p.m.
Feb. 3. E = 101°. 9.30 p.m.
Feb. 4. E = 103°.
Feb. 18. E = 99°, $1\frac{1}{2}$ times as bright as M.W. M.

Feb. 18. E = 80°. Lat. 6° N. A.C.
Feb. 21. E = 76°. Z.B. visible in Leo.
Feb. 22. E = 75°.
Feb. 25. Apex merged in M.W.
Feb. 26. E = 91°.
Feb. 27. E = 90°. M.
Feb. 27. E = 78°. Lat. 1° N. North edge best defined. A.C.

Feb. 27. Apex a little S.E. of Pleiades. Axis pretty near the ecliptic. γ Pegasi in N. boundary. α Piscium not far from S. border. E.E.M.

Feb. 28. E = 88°.
March 1. E = 87°.
March 2. E = 86°. Z.B. visible across sky.
March 3. End merged in M.W. Z.B. faintly visible.
March 4. As on 3rd.
March 5. End merged in M.W. Z.B. visible across sky. M.

March 19. Apex a little S. of Pleiades. Axis nearly coincident with the ecliptic or slightly to the south. α Arietis on N. margin. E.E.M.

March 23. Traced to Pleiades. E = 55°. W. P. Gayfer.

March 25. Width at horizon, 30°. E = 53°. Intensity = M.W.

April 1. Width = 35°. E = 47°. Intensity rather greater than M.W.

April 20. Width = 40°. E = 50°. Rather brighter than M.W.

April 21. Nearly the same as last night.

April 24. Width = 45°. E = 53°. Rather brighter than M.W. B.B.

Remarks on Observations.

Position of Apex.—The distance of the apex from the Sun has been calculated from the observations (when not given by the observer) whenever the latter were sufficiently definite to allow this to be done with some approach to exactness. The distance is denoted by "E." The observations made in Basrah and Mesopotamia show E. in many cases to be over 90°. while on several evenings the zodiacal band was seen stretching right across the sky.

The connection between the actual form of the Zodiacal Light and the angle E, is explained in the last Report. *See* Memoirs, XIX., p. 48.

A comparison of the observations made in this country with those made in lower latitudes shows that the elongation E. is on the whole greater in low latitudes. There is no doubt that this is due to the greater clearness of the atmosphere. There is no certain indication of any seasonal variation in the elongation. All the observation made by Major Molesworth have been plotted, including those made in 1914 and 1915. They appear to show that there may be a maximum about the end of January and the beginning of February, but this is open to doubt.

In a few cases the distance of the apex from the ecliptic is given, *i.e.* its latitude. It is probable that the apparent latitude is greatly influenced by atmospheric conditions.

Form.—The form of the Light, as sketched by different observers, differs considerably, but is always roughly triangular. Here, again, the state of the atmosphere has much to do with the appearance.

Intensity.—The light is frequently described as being brighter than the Milky Way. Generally speaking, it appears to have been at least equal to the Milky Way in brightness. The brightest part of the Light appears generally to have been on the north side of the ecliptic, but the Indian observations, made in January 1916, place it to the south of the ecliptic.

Colour.—The colour is generally described by observers as yellow and as being of a hue very distinct from the Milky Way. It is frequently described as gray in the Cape observations.

Variability.—The Light has been occasionally noted as being of unusual brightness. This appears in the observations made on the 31st of January and 3rd of February, 1918.

Zodiacal band.—This was seen on several occasions by Dr. Glanville and Major Molesworth, and on one occasion by Dr. Steavenson in England.

THE GEGENSCHEIN,

Several observations have been made of the Gegenschein,

1916 Feb. 5. What I took to be the Gegenschein was also easily visible, and was about as bright as the band, or perhaps slightly fainter. Not quite half as bright as M.W. in Monoceros. It was oval, about $8^\circ \times 15^\circ$, with long axis parallel to the elliptic. The sky was so clear that I was able to see it even when I got back to London, between 11.30 and 12. It was visible from my back garden at Norwood after my eyes had rested ten minutes or so. W.H.S.

Feb. 21. Seen 3° or 4° east of Regulus. The southern boundary in the ecliptic. G.

April 24. Visible. Centre about Spica. M.

Oct. 26. This evening I made out the Gegenschein just S. of α and β Arietis, E. of Jupiter; also streaks extending from Aries through Taurus were discernible.

Oct. 29. G. easily made out on the ecliptic between Aries and Taurus. Full and round.

Nov. 19. Seen almost below, but slightly W. of Pleiades.

1917 March 15. Seen south and a little west of Denebola. Shape oval, 8° long and 5° wide.

April 14. Centre, as nearly as could be determined, 203° R.A. and -8° Dec. Not so round as a month ago. G.

1918 Jan. 31. Suspicion of G. centre about 120° long. M.

The most noteworthy of these observations is the one of the Gegenschein made by Dr. Steavenson on the 5th of February, 1916. It is probably the first time this faint object has been

seen from a London suburb. It was only possible owing to the lights of London being extinguished during the Great War, and the observation is not likely to be repeated. It appears from Dr. Steavenson's remarks that there is a perceptible boundary between the zodiacal light and the zodiacal band, as he was able to give the exact position of the apex. The sketch that accompanied the account of the observation shows an interval of about 60° between the visible end of the zodiacal band and the Gegenschein. The evening of the 5th of February must have been unusually clear, as the zodiacal light was noted by Mrs. Wilson at Totteridge as being of extraordinary vividness. Both observers gave the same position for the apex. That the zodiacal light itself was not brighter than usual on this date is evidenced by the fact that in Mesopotamia the light was not noticed to be brighter than in January.

THE MOON'S ZODIACAL LIGHT.

1916 Feb. 21. At 8 p.m. I made a successful observation of the Moon's zodiacal light (reported by Jones and other observers). From my station I have an uninterrupted outlook on the waters of Chesapeake Bay, which form my E. by S. horizon, the point in fact of moonrise for that evening. The sky in that quarter was perfectly clear to the horizon. Leo was plainly in view, the Gegenschein showing on the ecliptic. At 8.15 a distinct luminosity, fainter than the Sun's zodiacal light but in the usual shape of the Sun's zodiacal in the vicinity of the horizon, was visible from the moonrise point, reaching the southern boundary of Leo up to the Gegenschein, which became commingled with the light. This luminosity persisted until moonrise at 8.40. I was convinced of the fact; it was unmistakable. An hour previously I had watched the Sun's zodiacal light in the west. That light was still in evidence, though setting. R.A. of Moon $12^h\ 8^m$., Dec.—5° 41′. (The Moon was consequently 4° S. of ecliptic.) G.

Remarks.—As the light of the full Moon is only about one-millionth the intensity of sunlight, it is difficult to believe that the phenomenon above described can be due to the light of the Moon.

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SECTION FOR THE OBSERVATION

OF

THE SUN.

DIRECTOR.—E. WALTER MAUNDER, F.R.A.S.

FOURTEENTH REPORT OF THE SECTION, 1910–1919.

INTRODUCTION.

The last report of the Solar Section—the Thirteenth—was issued in 1910, and dealt with the solar surface in the years 1903 to 1909. Thus for eleven years no report of the work of the Section has appeared.

The years 1910 to 1914 were, on the whole, years of profound quiet for the solar surface, and in consequence the Sun attracted very few observers. With the revival of solar activity there came the Great War, and the strain which everyone felt during its continuance rendered it practically impossible to revive the work of the Section on the lines adopted by its first two Directors.

The Sun does not lend itself well to concerted work by amateur observers. This is very far from saying that individual observers have not done great things in solar research ; it was the individual work of Scheiner, in the first place, and, in the course of last century, of Schwabe and of R. C. Carrington, that formed the foundation upon which our present knowledge of the Sun has been based, and there is still much work for the individual observer to do. The photographic plate has not yet, even for the Sun, done away with the necessity for direct visual observation. Finer detail can be discerned directly by the eye at the telescope than is shown even on the photographs of the Greenwich series, and a practised observer watching the Sun continuously for some hours will be able to follow the course of solar changes with a better apprehension of the true course of events than could be afforded except by an accumulation of photographs so great as to be prohibitive. There is still room, therefore, for the individual observer to devote himself to the study of minute changes in specially selected groups of spots or faculæ ; to the analysis of the life-history of such groups and of

the association between spots and faculæ, and the like. But such work is individual work, to be carried on by a single observer, or at most by two or three friends acting in constant co-operation with each other, and the results of such study would be more suitably published in the form of a series of monographs than in an ordinary Sectional Report.

Nevertheless, the energy of a number of Members enabled the Director, as soon as the Armistice gave hope of a return to peace conditions, to organise two species of solar research which lent themselves to, and indeed required, mutual co-operation. The first of these was a search for spots on the Sun without any optical aid, the only instrument to be employed being a dark glass to protect the eye from the solar glare. Even this aid could be dispensed with when the Sun was rising or setting in a smoky atmosphere, or when a beneficent fog interposed a kindly screen.

The second research was a discussion of the distribution of the faculæ between the East and West limbs of the Sun as recorded in the Greenwich Photoheliographic Results, extending over the years 1874 to 1916. In November, 1919, the Director published an appeal in the *Journal* for assistance in this work, and seven Members very generously expressed their willingness to take part in it. These were :—Messrs. R. M. Fry, Anthony Johnson, H. W. Raisin, B. G. Ronalds, D. R. Sharpe, and H. C. Trent, together with the late Mr. Bruce Clarke. The Director desires to express to them his most grateful thanks. Two of them, Mr. Anthony Johnson and Mr. B. G. Ronalds, also gave the Director great assistance in the work of examination. The results of this discussion form the most important part of the present Report, and there still remains abundant opportunity for similar sectional work in the future.

An important contribution to the present Memoir has been made by Prof. Marcel Moye, D.-en-D., a Member of the Association of many years' standing, in his record of his watch on the Sun with a refractor of 2 inches aperture, in which he gives in tabular form a sketch of the changes in the solar activity during the two and a half solar cycles that have elapsed since the foundation of the Association.

Next, the Director, aided by the observations which Members have sent in to him from time to time, has drawn up a very short summary of the solar activity in the ten years, 1910 to 1919, covered by the Report, and he desires here to express his thanks to the Members who have supplied him with material for it :—Mr. H. B. Adames, Mr. William Barnett, the Rev. C. D. P. Davies, M. Maurice Du Martheray, Col. Markwick, Mr. J. P. M. Prentice, and Mr. William Strachan.

This has been supplemented by some special studies of the solar surface based on the observations of Messrs. Barnett, Du Martheray, and Strachan, illustrating the lines of observation which different Members have undertaken, and the forms in which they have recorded them ; for the Director has thought that new Members of the Association might like to follow some of these methods in their own observation. For this purpose it will no doubt be helpful to them to have access to

two papers published by the Rev. A. L. Cortie, S.J., during his term of office as Director of the Section, namely, one on the Types of Sunspots, and another, which deals with the methods of observing the Sun by projection on a screen, and of determining the heliographic latitude and longitude of the markings on its surface by the use of a set of orthographic projections of the Sun, prepared by Father Cortie at Stonyhurst, and known as the "Stonyhurst Discs."

The regular observer of the Sun will almost certainly wish to have the means of fixing the co-ordinates of the markings which he observes so as to identify them in their apparent transit across the disc, and the use of the Stonyhurst discs, just referred to, enables this to be done with sufficient precision for general identification. But greater accuracy can be obtained by following the method worked out by the late R. C. Carrington, of which, therefore, a full explanation has been supplied

Carrington's method is in principle the one adopted in the reduction of the photographs at Greenwich, but the use of photographic plates and a micrometer for their measurement permit of a greater accuracy and considerably greater detail in the results obtained. Photographs of the Greenwich micrometer are, therefore, given by the kind consent of the Astronomer Royal, Sir Frank W. Dyson, together with a description of the method of measurement.

The Astronomer Royal has also permitted the reproduction of photographs of four groups observed at the chief turning points of the solar activity in the ten years of observation, and of the disc of the Sun at the time of its greatest disturbance. For a beautiful set of drawings illustrating the great group of 1919 May, the Section is indebted to M. M. Du Martheray.

1. Search for Sunspots visible to the unaided Sight.

In the *Journal*, Vol. XXIX., No. 1, published Nov. 23rd, 1918, p. 34, the Director inserted a note to the effect that he would "be glad to receive the names of any Members who would undertake the systematic daily examination of the Sun for the detection of sunspots without telescopic power (that is, using only a dark glass) for the purpose of determining the limits of naked eye vision."

With the increase of telescopic power in the last fifty years a controversy has arisen over the true character of certain minute markings detected on the surfaces of Venus, Mars, Jupiter, and Saturn, and how we ought to interpret them. The only way by which we can do this with certainty is by making similar observations with very low powers, and comparing the effects then recognised with what we learn of similar appearances when our optical equipment is very much increased in power.

There are two heavenly bodies which present to us a visible surface with the lowest optical power of all, viz., the naked eye. These are the Sun and the Moon. The Moon has the advantage over the Sun in that its surface always offers detail, but the disadvantage, for the present purpose, in that this detail is too

familiar to us. The Sun, on the other hand, though it is often without any markings visible to the unaided sight, yet from time to time does present spots which can be so detected, and these have the advantage that they cannot be predicted as to their position, size, or shape, or even as to when they will occur.

Sketches of the Sun, made with the naked eye, can afterwards be compared with solar photographs, and there is, at the Royal Observatory, Greenwich, a series of such photographs which practically form a complete series, day by day, for many years in succession, on a large and uniform scale. Comparing our naked-eye sketches with these, we can ascertain the smallest dimensions which a spot must present in order to be within the grasp of ordinary good sight, and we can recognise how markings which individually are far below the limit of separate vision are combined by the eye so as to give rise to certain simple impressions.

A combined search for sunspots visible to the unaided sight seemed to offer the prospect that some definite increase might be made in our power of interpreting the forms presented to us when the planetary surfaces are examined by high telescopic power, and the Director therefore issued the above invitation with the object of attempting such an enquiry. Sixteen volunteers responded to it, but in several cases the volunteers found that their sight was not good enough to make them successful observers, or that the work strained their eyes. But five observers carried on the search with great assiduity during 1919. Of these, however, one found that his sight was becoming impaired, and that his later observations were not comparable with the earlier. The other four observed very steadily and successfully throughout the year, and their results are alone employed in the accompanying Table. Four other observers took part in the search, but less regularly; namely, Mr. C. Clark, Mr. C. Grover, Col. E. E. Markwick, and the Director.

In his directions issued to the volunteers, the Director asked that they would, as far as possible, carry on the search at every suitable opportunity, and record its results in a notebook specially reserved for that purpose. The search was to commence on January 1, 1919, and the observation book was to be retained by the observer until the end of the year 1919. Every occasion when the Sun was examined was to be recorded, whether spots were seen or not. If spots were detected, the disc of the Sun was to be represented by a circle drawn by running a pencil round a penny, and the position of the spot marked as precisely as possible within it. A line was to be drawn below the circle parallel to the line of the horizon; the time was to be inserted to the nearest quarter of an hour, so that the true position angle of the spot from the North Point of the Sun could be inferred from the little diagram for the time of observation. This was important as affording a means of testing the accuracy with which the observation had been made. Attention was also drawn to the need of using a dark glass of sufficient depth, both on account of the danger to the eyesight if the image of the Sun was too brilliant; and because spots are more easily seen if there is little or no irradiation from the image of the Sun as observed.

The names of the four regular observers are given below :—

Maurice Du Martheray, Switzerland.

Robert Henzi, Switzerland.

B. G. Ronalds, Herefordshire, England.

Wilfrid Williamson, Shetland Isles.

The total number of observations obtained by the several observers were as under :—

Observer.	Sun Spots seen on	Sun's Disc blank on	Total number of days of Observation.
Du Martheray - -	55 days	26 days	81 days
Henzi - - -	55 ,,	84 ,,	139 ,,
Ronalds - - -	54 ,,	70 ,,	124 ,,
Williamson - -	52 ,,	52 ,,	104 ,,

The total number of separate days upon which observations were made was 259, and of these, 96 showed spots visible to all who were observing on that day; on 23 days, discordances were noted between different observers. In other words spots were seen, or believed to have been seen, on nearly half the days of observation.

It has not yet been possible to complete the comparison of these observations with the photographs in the Greenwich series. The measures of that series are complete up to the end of June 1919, but the record for the second half of the year is still imperfect as the photographs from the Cape Observatory have not yet been received.

But it may be stated that a spot with area less than 700 millionths of the Sun's disc at mean distance appears to be too small to be detected by average good sight. On the other hand, the observers seldom failed to secure a definite observation of any spot that covered 900 millionths. Or,—to express the same conditions in other terms,—a well-defined circular spot should have a diameter of 31 seconds of arc to be visible to the naked eye, while one having a diameter of 36 seconds ought not to escape a careful search made under good conditions.

Directly the materials for a complete discussion are available, an Interim Report will be published, giving the full results.

A small figure attached to the letters S or O in the following Table indicates that two or more Members observed independently on the same day. Two figures are attached to the letter D, of which the one on the left indicates the number of observers who detected a spot on the Sun, and that on the right, the number that failed to do so.

TABLE.

Result of Search for Sunspots visible to the Unaided Sight made during the Year 1919.

Day of Month.	Jan.	Feb	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	O	—	S	—	S	O^2	—	O^2	—	S	—	S^2
2	O	O	O^2	O	S	—	O^2	O	—	—	—	O
3	O	O	S	O	S	O^2	O	O	—	S^2	—	O^2
4	O^3	$D^{2\cdot1}$	O	O	—	S	O^2	—	—	S	O	—
5	—	S	O	—	S^2	—	—	S	$D^{2\cdot1}$	O	—	O
6	O	—	O	O^2	S^3	—	O	S^2	$D^{1\cdot3}$	O^2	—	—
7	O	—	$D^{1\cdot1}$	O^2	S	O^3	O^2	S^3	—	O	S	—
8	S	S^2	S	O	S^3	O^2	O	S	O^2	—	—	O
9	S	S^4	S	S^3	S^4	O^2	O	S	O	S	—	—
10	S^2	S^2	—	O	S^2	O	—	S^2	$D^{2\cdot1}$	S^2	O	O^2
11	S^4	$D^{3\cdot1}$	S^2	—	—	$D^{1\cdot1}$	O	S	S^2	S	O^2	O
12	S	S^3	S	O^2	—	S	$D^{1\cdot1}$	S	S^3	—	O	—
13	$D^{1\cdot1}$	S^3	O	O	$D^{1\cdot3}$	S^3	—	$D^{1\cdot1}$	S^3	S	O^3	—
14	$D^{1\cdot1}$	—	O	O^2	O^3	S^3	S^2	—	S^2	S	O	—
15	$D^{1\cdot1}$	—	O	O	$D^{2\cdot1}$	S^2	S	S^2	S^2	S	O	—
16	$D^{1\cdot1}$	—	$D^{1\cdot1}$	—	S^4	S^3	—	—	S	O	O	—
17	O	—	—	—	S^3	S^2	—	S^2	S^3	O	—	—
18	O	O	O	O^2	S	S^4	O^2	S^3	O	O^2	—	—
19	O^3	$D^{1\cdot2}$	O^2	O	S^2	S^2	—	S^4	—	O	—	O
20	O	—	—	O^3	S^3	S^3	—	S^3	—	O	O	O^2
21	—	O	O	O^2	S^2	S	—	S^3	O^3	—	O^2	—
22	—	O	—	O^2	S^2	—	O	S^2	O	O	—	—
23	—	—	O	$D^{2\cdot1}$	$D^{3\cdot1}$	—	S	O	O	O	—	—
24	—	—	O^2	S	O^2	—	$D^{1\cdot1}$	O^3	O	O	—	O
25	—	O	O	O	O^3	—	—	—	O	—	S	O
26	O^2	O	S^2	O^2	O^3	O	—	O^2	$D^{1\cdot1}$	O	S^3	O^2
27	O^2	O	—	$D^{1\cdot1}$	O	—	O	—	S^2	O	S^2	—
28	O^2	O	S	O	O^2	—	O^2	O	$D^{1\cdot1}$	—	S	—
29	O		—	—	O^3	—	O	—	$D^{1\cdot1}$	S^2	S^2	O
30	—		S^2	O	O^2	O^2	O^2	—	—	S	S	—
31	O		—		O^2		O^2	O		S		—

Spots seen with the naked eye - (S) on 95 days.
Sun's disc appeared to be blank - (O) „ 140 „
Observations discordant - - (D) „ 24 „
No observations obtained - - (—) „ 106 „

Total - - - - 365 „

2. Sunspot Observations with a 2-inch Telescope, 1893-1919.

By MARCEL MOYE, D.-en-D.,

Professeur à la Faculté de Droit, Université de Montpelier (Hérault), France.

"All observations were made with the same instrument (2-inch O.G. refractor) and by the projection method. From 1893 to 1898 (inclusive) I stayed at Bordeaux, where cloudy skies often frustrated any attempt to view the Sun. Afterwards Montpelier proved a very favourable climate for such observations, and, often, I have been able to enjoy observing every day of the month. Observations of the Sun with a little portable refractor are quite

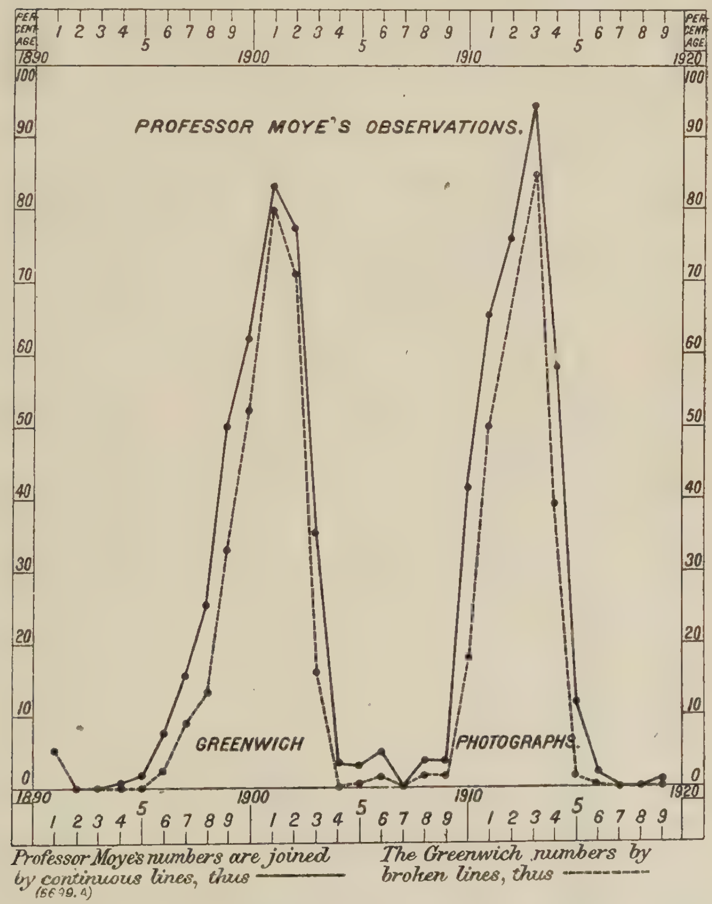


Fig. 1.—Annual percentage of Days on which the Sun was Free from Spots during the years 1891 to 1919 as observed by Prof. Moye and on the Greenwich Series of Solar Photographs.

easy, and are made in a couple of minutes and the observer soon feels himself acquainted with the enigmatic undecimal rhythm of our luminary."

The following table is compiled from the statistics below so far as they relate to the days in each year, from 1893 to 1919, upon which Prof. Moye observed the disc of the Sun to be free from spots; corresponding details, derived from the Greenwich Photo Heliographic Results, being added for the sake of comparison. It will be seen how closely Prof. Moye's results accord with those from Greenwich in their presentation of the changes in the solar activity, as inferred from the absence of sunspots. Fig. 1 furnishes the same comparison in a graphical form. The positive aspect of sunspot change is represented in Fig. 2, where the curve derived from the mean daily spotted *area* of the Sun as measured at Greenwich is compared with that deduced from Prof. Moye's tables as to mean daily *number* of spots.

Comparison of the Annual Percentage of Spotless Days during the years 1891 to 1919 as observed by Prof. Moye and deduced from the Greenwich Photographs of the Sun.

Year.	Greenwich Observations.			Prof. Moye's Observations.		
	Days of Observation.	Days without Spots.		Days of Observation.	Days without Spots.	
		N mber.	Per-centage.		Number.	Per-centage.
1891	363	19	5·2	—	—	—
2	362	0	0·0	—	—	—
3	362	0	0·0	201	0	0·0
4	364	0	0·0	163	1	0·6
5	364	0	0·0	191	3	1·6
6	364	8	2·2	212	16	7·6
7	364	32	8·8	182	28	15·4
8	363	48	13·2	207	53	25·6
9	364	123	33·8	262	132	50·4
1900	360	191	53·0	216	135	62·5
1	359	289	80·6	273	229	83·6
2	349	248	71·0	249	193	77·5
3	350	56	16·0	230	81	35·2
4	363	0	0·0	262	8	3·1
5	364	2	0·6	230	7	3·0
6	364	5	1·4	262	13	4·9
7	365	1	0·3	257	0	0·0
8	366	6	1·6	281	10	3·6
9	364	5	1·4	267	9	3·4
1910	365	65	17·8	257	106	41·2
1	364	183	50·3	282	184	65·2
2	365	246	67·4	286	217	75·9
3	365	311	85·2	286	270	94·4
4	365	143	39·2	270	157	58·1
5	365	5	1·4	282	33	11·7
6	365	1	0·3	319	6	1·9
7	365	0	0·0	324	0	0·0
8	365	0	0·0	317	0	0·0
9	365	0	0·0	325	3	0·9

Month.	Days of Observation.	Days without Spots.	Number of Groups.	Number of Spots.	Days of Observation.	Days without Spots.	Number of Groups.	Number of Spots.	Days of Observation.	Days without Spots.	Number of Groups.	Number of Spots.
	1893.				**1894.**				**1895.**			
Jan.	17	0	71	348	15	0	58	382	15	0	52	263
Feb.	12	0	53	277	11	0	58	272	12	0	35	152
Mar.	22	0	69	393	20	0	43	212	17	0	43	243
Apl.	23	0	100	520	9	0	38	258	17	0	58	271
May	21	0	86	489	10	0	29	203	15	0	31	181
June	18	0	78	579	13	0	60	269	17	0	37	253
July	10	0	31	152	13	0	47	206	19	2	31	129
Aug.	20	0	100	543	14	0	26	279	9	0	20	113
Sept.	19	0	73	498	15	0	35	195	25	0	52	205
Oct.	15	0	81	513	20	1	53	548	18	1	43	235
Nov.	12	0	38	335	12	0	25	133	15	0	34	196
Dec.	12	0	72	435	11	0	32	249	12	0	43	187
Total	201	0	852	5,082	163	1	504	3,206	191	3	479	2,428
	1896.				**1897.**				**1898.**			
Jan.	12	1	10	40	11	0	21	141	13	0	15	87
Feb.	20	0	34	233	9	0	9	40	16	0	30	198
Mar.	15	0	25	125	22	1	22	118	17	7	34	197
Apl.	20	4	33	193	20	6	23	101	21	10	12	62
May	28	7	27	157	22	8	18	128	14	0	17	70
June	18	0	33	203	16	5	10	44	20	6	15	53
July	20	0	38	171	18	0	26	133	27	17	13	61
Aug.	12	2	6	34	14	0	18	113	10	0	33	192
Sept.	19	0	37	405	9	0	13	75	23	1	32	231
Oct.	19	1	18	78	13	2	9	47	15	2	26	128
Nov.	14	1	30	109	11	5	6	32	7	0	5	17
Dec.	15	0	32	148	17	1	25	268	24	10	21	91
Total	212	16	323	1,896	182	28	200	1,240	207	53	253	1,387
	1899.				**1900.**				**1901.**			
Jan.	11	0	15	67	16	8	9	50	16	16	0	0
Feb.	14	12	3	11	12	9	5	21	17	13	1	5
Mar.	14	0	22	114	22	11	14	66	19	12	11	33
Apl.	17	3	10	37	8	0	11	42	24	24	0	0
May	25	12	5	22	14	9	17	73	30	18	19	230
June	22	6	19	123	21	10	13	89	30	18	11	37
July	22	11	12	55	24	14	10	39	26	26	0	0
Aug.	22	22	0	0	20	17	3	9	25	25	0	0
Sept.	25	22	5	39	25	16	9	25	20	20	0	0
Oct.	31	17	16	100	19	8	16	94	19	19	0	0
Nov.	30	16	12	34	14	12	3	8	27	18	9	9
Dec.	31	11	11	55	21	21	0	0	20	20	0	0
Total	264	132	130	657	216	135	110	516	273	229	51	314

Month.	Days of Observation.	Days without Spots.	Number of Groups.	Number of Spots.	Days of Observation.	Days without Spots.	Number of Groups.	Number of Spots.	Days of Observation.	Days without Spots.	Number of Groups.	Number of Spots.
	1902.				**1903.**				**1904.**			
Jan.	20	13	6	47	18	9	5	21	18	1	33	127
Feb.	12	12	0	0	19	2	25	84	20	4	22	141
Mar.	20	11	14	97	23	12	11	32	20	0	27	129
Apr.	13	13	0	0	20	5	16	46	19	0	41	214
May	24	18	2	10	19	13	6	26	21	0	41	153
June	24	22	2	2	23	14	14	68	25	0	38	181
July	26	26	0	0	20	3	30	157	30	0	57	278
Aug.	20	20	0	0	20	10	14	46	21	0	31	139
Sept.	24	16	6	17	14	9	5	23	20	0	28	135
Oct.	23	11	18	54	14	1	28	227	24	0	48	284
Nov.	21	11	11	103	26	0	49	434	25	0	41	168
Dec.	22	20	2	2	14	3	27	98	19	3	46	234
Total	249	193	61	332	230	81	230	1,262	262	8	453	2,183
	1905.				**1906.**				**1907.**			
Jan.	21	0	36	162	16	0	13	197	25	0	20	428
Feb.	22	0	67	478	19	0	11	151	23	0	23	618
Mar.	18	0	38	370	20	0	21	279	28	0	16	285
Apr.	17	0	25	102	15	0	13	169	24	0	12	199
May	17	2	33	155	27	0	13	338	22	0	8	202
June	22	0	34	230	30	1	25	360	25	0	9	256
July	27	4	51	525	25	0	21	522	26	0	13	317
Aug.	16	0	45	464	23	0	19	268	22	0	13	287
Sept.	14	1	21	101	23	0	14	317	20	0	13	292
Oct.	19	0	50	465	18	12	2	14	16	0	11	205
Nov.	16	0	67	536	22	0	19	224	13	0	10	379
Dec.	21	0	42	252	24	0	15	394	13	0	10	190
Total	230	7	509	3,840	262	13	186	3,233	257	0	158	3,658
	1908.				**1909.**				**1910.**			
Jan.	25	0	11	177	23	0	12	265	23	1	6	113
Feb.	23	3	11	137	24	1	10	269	20	7	4	118
Mar.	31	3	13	137	20	0	11	263	21	2	6	60
Apr.	22	0	14	337	20	0	6	199	21	13	4	16
May	26	1	11	113	26	0	8	189	16	7	4	24
June	24	0	10	244	21	0	8	122	23	14	4	42
July	29	3	16	274	29	6	7	270	23	16	3	51
Aug.	25	0	14	448	24	0	13	130	27	13	4	44
Sept.	22	0	14	381	20	0	8	139	21	3	7	87
Oct.	20	0	7	133	18	0	12	216	22	2	6	190
Nov.	16	0	10	186	22	0	12	246	19	14	1	17
Dec.	18	0	11	166	20	2	10	199	21	14	3	26
Total	281	10	142	2,733	267	9	117	2,507	257	106	52	788

Month.	Days of Observation.	Days without Spots.	Number of Groups.	Number of Spots.	Days of Observation.	Days without Spots.	Number of Groups.	Number of Spots.	Days of Observation.	Days without Spots.	Number of Groups.	Number of Spots.
	1911.				**1912.**				**1913.**			
Jan.	25	19	6	10	16	16	0	0	15	15	0	0
Feb.	23	14	9	46	17	17	0	0	18	15	4	12
Mar.	20	14	6	32	27	16	11	44	22	22	0	0
Apr.	23	5	25	69	22	17	5	48	22	20	2	5
May	24	12	17	30	24	19	5	7	28	28	0	0
June	23	19	4	4	25	13	12	12	27	27	0	0
July	31	27	7	8	29	23	6	18	31	28	3	6
Aug.	28	17	14	20	25	22	3	5	28	28	0	0
Sept.	27	17	10	13	25	10	15	38	26	23	3	4
Oct.	15	10	5	15	26	22	4	11	20	20	0	0
Nov.	22	14	8	12	24	24	0	0	22	22	0	0
Dec.	21	16	5	20	26	18	8	61	27	22	5	24
Total	282	184	116	279	286	217	69	244	286	270	17	51
	1914.				**1915.**				**1916.**			
Jan.	25	20	5	13	23	4	34	120	30	2	66	256
Feb.	14	10	4	10	16	0	38	106	15	0	50	189
Mar.	23	19	4	6	27	1	67	174	27	0	71	403
Apr.	27	3	27	155	24	6	34	136	24	0	57	289
May	24	20	4	29	19	10	16	77	30	0	98	430
June	28	14	15	90	24	8	55	322	30	0	88	487
July	23	16	7	18	28	0	78	333	30	0	95	329
Aug.	25	15	10	50	30	0	75	392	31	3	51	210
Sept.	28	9	28	57	30	0	75	263	28	0	60	381
Oct.	20	15	5	9	20	0	48	258	28	1	78	367
Nov.	19	14	21	104	23	0	39	159	23	0	80	426
Dec.	14	2	21	82	18	4	21	97	23	0	62	275
Total	270	157	151	623	282	33	580	2,437	319	6	856	4,042
	1917.				**1918.**				**1919.**			
Jan.	25	0	81	419	22	0	96	314	26	0	69	220
Feb.	18	0	54	300	24	0	72	259	19	0	66	275
Mar.	27	0	132	734	27	0	74	275	21	0	76	271
Apr.	26	0	82	479	24	0	86	304	25	0	62	251
May	30	0	89	390	28	0	77	384	27	0	112	491
June	30	0	179	580	29	0	75	288	30	0	156	589
July	31	0	137	790	30	0	138	616	31	0	117	311
Aug.	31	0	187	851	30	0	107	664	31	0	116	403
Sept.	29	0	126	582	30	0	79	345	30	0	75	321
Oct.	30	0	109	472	27	0	90	455	31	0	102	316
Nov.	25	0	93	424	19	0	83	291	26	1	55	199
Dec.	22	0	154	618	27	0	84	290	28	2	53	144
Total	324	0	1,423	6,639	317	0	1,061	4,485	325	3	1, 59	3,7 1

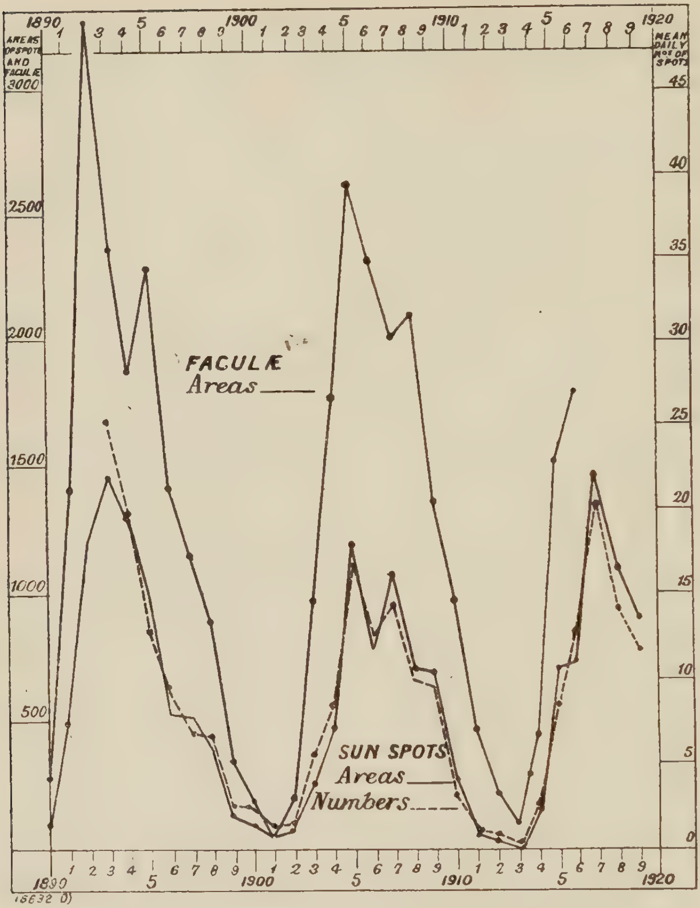


Fig. 2.—Mean daily Areas of Sunspots and Faculæ for the years 1890 to 1919 as measured at Greenwich on the Solar Photographs, compared with the mean daily Number of Spots as observed by Prof. Moye.

[Prof. Moye has for many years past favoured the Director of the Solar Section with half-yearly reports, in which the number of spot groups, and of individual spots, seen on the Sun's disc are reported for every day on which observation was possible. The work has now been carried on by him for more than 27 years, with the utmost regularity, the observations being made throughout by projection with a refractor of two inches aperture and a magnifying power of 60. In the statistics supplied in these half-yearly tables every group and every spot is recorded as one on every day that it is to be seen. The observations are, therefore, comparable throughout, and furnish—within the limit of their purpose and of the means employed—a continuous and systematic index of the changes of the solar activity. The close agreement between the two sunspot curves in the above diagram affords an index of the high value of M. Moye's work.—DIRECTOR.]

3. Summary of the Solar Activity; 1910 to 1919.

1910.

It is a characteristic of the solar cycle that the rise from minimum to maximum proceeds more rapidly than the fall from maximum to minimum; indeed, there is often "a check in the fall," during which the downward tendency ceases to be apparent, or is even reversed for a time. Such a check took place during the years 1908 and 1909, for which years the mean daily spotted area was practically the same. But 1910 showed a sudden and great falling off in the solar activity, the Sun having been altogether free from spots on 65 days, as against 5 in 1909 and 6 in 1908. This falling off was most pronounced in the Northern hemisphere, which now entered definitely on the minimum phase, being void of spots on 222 days in the year. Comparing the spotted areas of the two hemispheres the Southern was three times as prolific as the Northern, so that its preponderance, which is generally characteristic of the period of decline from maximum to minimum, was strongly marked.

The chief disturbance of the year occurred at the end of September, when a fine stream made its third appearance. First seen on August 3 as a regular spot on the East limb, it made three complete transits across the Sun's disc; but between the second and third apparitions it underwent a great development, and was seen as a very fine irregular stream—No. 6894 in the Greenwich Series*—during its third transit. It diminished rapidly, but was still a large spot when last seen at the West limb on October 9. Two important groups were also seen during February, the earlier returning again in March, and making two complete transits. The major axis of the group was nearly perpendicular to the Sun's equator on both occasions (Nos. 6813 and 6826). The other (No. 6818) evidently formed close to the East limb, and made a complete transit, but did not return after passing off at the West. It was a very large irregular cluster, undergoing continual change. All these groups were in the Southern hemisphere.

The mean daily areas of faculæ showed a distinct falling off in 1910, but the change was neither so sudden nor so great as with the spots. The areas of faculæ in the Northern hemisphere were smaller than in the Southern, but there was not so great a disproportion as in the case of the spots, for the Northern faculæ were about half the Southern in extent. As with the spots, this preponderance of the Southern hemisphere is, in general, characteristic of the period of decline from maximum to minimum.

1911.

The rapid decline in the mean daily spotted area that began in 1910 was continued in 1911, the figures obtained being but one quarter of those of the previous year. The faculæ also showed

* *See* Mr. Strachan's study of the group, pp. 33 and 34, and Plate II. A.

a marked decline, but not to the same proportion, their area being 47 per cent. of that for 1910. The distribution with respect to the equator of the areas both of spots and faculæ maintained the same proportions in 1911 as in 1910; in both years the Northern hemisphere had only one-quarter of the spotted area; one-third of the areas of faculæ. No single group of great importance was noticed in the year, and the Sun was free from spots on 183 days.

1912.

The year 1912 showed the rapid decline in the solar activity that began in 1910 as still proceeding. The Sun was free from spots on 246 days and the Northern hemisphere was almost entirely barren. Only five very small Northern groups, each seen on but a single day, were recorded in the whole year until the month of December was reached, when a feeble revival, the herald of the new cycle, was observed. The Southern hemisphere showed no great change in its characteristics from 1911. The faculæ in the Southern hemisphere had fallen off in a greater proportion than the spots.

1913.

The rapid decline in the mean daily spotted area seen in the three preceding years was continued in 1913 almost to the point of a total absence of spots, the few that were observed being confined almost wholly to the beginning and end of the year. For seven months the Sun was nearly always free from spots, and Wolf's "Relative Numbers," as revised by Wolfer, show that no year since 1810 has been so barren as 1913. The areas of the faculæ also showed a great falling off from 1912, but not nearly in the same proportion as of the spots. Both for spots and faculæ, the year was unmistakably that of minimum, but, comparing the two hemispheres, the predominance which from 1907 onward had lain with the Southern hemisphere, now passed to the Northern, an indication that the new cycle had begun. The number of days without spots was 311, and the minimum for spots fell early in June; for faculæ, nearly three months later, *i.e.*, about the middle of August.

1914.

This year was distinguished by the unmistakable and strongly marked revival of solar activity as regards both spots and faculæ. A few high latitude groups of small extent had been seen in December 1912 and sporadically in 1913, but the first important group of the new cycle was that first seen on the East limb on March 30 of this year. This was a large group (No. 7030),* seen throughout a complete transit and continuously active. Another fine group, also in the Northern hemisphere, (No. 7060), was seen first on the East limb on August 13 and, after making two complete transits, was last seen, as No. 7068, on the west limb on September 22. These were the chief disturbances of the year, and illustrate the predominance of the

* *See* pp. 36–38 and Plate II. B.

Northern hemisphere in the early years of the new cycle. The chief Southern group of the year (No. 7047) formed in the visible hemisphere on June 12, and passed out of sight at the West limb on June 22. It did not return.

The faculæ showed a very distinct revival in 1914, but not in the same proportion as the spots. The faculæ of the Northern hemisphere covered a slightly larger area than in the Southern, so that the Northern hemisphere had now the predominance in both spots and faculæ. The number of days without spots was 143 in 1914, as compared with 311 in the year that had preceded it. Studies by Mr. Barnett of some of the groups of 1913 and 1914 are given on pp. 35–38.

1915.

The increase in the spotted area of the Sun which was so strikingly manifested in 1914 was continued yet further in 1915, the record for the year dividing itself naturally into three distinct periods. Three months of moderate activity came first, during which several important groups were seen, but, between these disturbed areas, there were wide regions destitute of spots. A period of great disturbance set in next, and lasted for nearly five months, during which time important spots tended to become more numerous and to attain greater dimensions. The outbreaks were also more equally distributed in longitude round the entire Sun. The last four months of the year formed a period of more moderate activity, the spot groups seen being of smaller size and less subject to violent change. It is significant to note, as showing how rapidly the solar activity had revived, that there were no days in 1915 whereon the Sun was entirely free from spots.

The most important disturbances of the year were the following :—The period of greatest activity was opened by the appearance of a very large spot (No. 7223 of the Greenwich series) on the East limb on March 20. The group returned in the two following rotations and made three complete transits of the disc, passing out of sight at the West limb as No. 7285 on June 5. By this date it had shrunk to insignificance. In July three groups, all easily seen with the naked eye, appeared in the Southern hemisphere—Nos. 7330, 7354, and 7368. All three made complete transits of the disc. A short study by Mr. Strachan of the spot-groups of November appears on p. 39.

1916.

With 1916 the development of the solar activity which had been so remarkable in the two preceding years received a check, the mean daily area both for spots and for faculæ showing no great increase upon 1915. The first half of the year did indeed show a fairly steady progress in the spotted area, leading up to the secondary maximum in May and June, but it was followed by a curious failure in the Southern hemisphere in the latter part of the year—a failure which was mainly accountable for the halt in the progress of the general spot activity presented by the year as a whole. The last few days of the year, however, showed a sharp recovery, principally in the Northern hemisphere.

1917.

The progress of the solar activity which had shown so remarkable a check in the latter half of 1916, resumed its progress with the appearance of a fine procession of spots in the Northern hemisphere that had been inherited from the last days of 1916. After this had passed off at the West limb, the rest of 1917 January remained uneventful, but early in February a superb stream appeared in the Southern hemisphere, the earlier of the two giant groups of the year (*see* Plate II. C.). A period of many minor disturbances followed, and lasted until April 5, when a quiet week intervened. From April 12 onward the solar activity increased again till its second culmination in the yet larger group of August 4-16 (*see* Plate I.). September and October witnessed another decline, which lasted till near the end of November, after which a new revival set in, and was not exhausted by the end of the year. These great outbursts make 1917 indubitably the year of maximum for the cycle now in progress, the mean daily spotted area being practically double that of 1916.

The two chief groups of the year rank among the six largest groups recorded in the last forty-eight years ; the total spotted area for the day, August 10th, was the heaviest recorded since 1873 ; the mean daily area for the month of August, 1917, and for the whole year, were the heaviest for that same period. Indeed during the second week of August there were no fewer than four independent groups visible to the naked eye at the same time.

1918.

In 1918 the solar activity had clearly begun to decline. There were no groups of spots at all approaching in size and interest the two giant groups of 1917, but a high degree of activity was still maintained, some groups of the second order of importance and many of the third being observed. These, like the spot groups of 1917, included several striking "processions" of groups following each other at short intervals along a parallel of solar latitude. The chief processions were seen May 3–13, July 3–9, and August 3-11 ; while at the end of May and beginning of June no fewer than eight groups, arranged in four pairs, appeared at the East limb. There were also several instances of what may be termed "scattered disturbances," where a broad area was sown, as it were, with small half-developed spots without any definite arrangement. Such "scattered disturbances" were seen July 17–28, July 26-Aug. 6 ; and one of better developed spots October 18–29. But the species of formation most characteristic of the year was that of a "stream" of spots, sometimes so nearly continuous, at any rate during part of its history, as to differ but little from a single very elongated spot. Quite a dozen examples of this type of formation might be mentioned. The mean daily spotted area for the year was about three-fourths of that for 1917, or about half as much again as that for 1916.

1919.

The year 1919 proved to be an active period and must manifestly be included as belonging to the maximum period, though the decline in the spotted area from 1918 was considerable. The month of greatest spotted area was June, though on some days during March, May and August a maximum area of about 2,500 millionths of the Sun's visible hemisphere was reached. In June, however, the activity was more consistently maintained than in other months. After August, the spot activity steadily declined and had become comparatively insignificant by December. A special report by M. Maurice Du Martheray on "The Solar Activity of 1919" appears on pp. 42–45, and he also supplies drawings of the great May group on p. 44. A photograph of the extended disturbance of August appears in Plate II. D.

SPECIAL STUDIES.

4. History and Types of the last great Spot-Group of the Cycle 1901–1913.

By WILLIAM STRACHAN, F.R.A.S.

Observations made at Bournemouth, with 5-inch Wray refractor, Watson tube, Grubb clock-driven equatorial. Determinations of heliographic positions of spots by projection and use of the "Stonyhurst discs."

September 26th, 1910, at $0^h\ 47^m$ p.m. G.M.T.

Group 59. Lat. 13°·9, S. Long. 52°. Too near the limb to assign type. An irregular disturbance.

September 27th, 1910, at $0^h\ 30^m$ p.m. G.M.T.

Group 59. Did not get measurements.

Type III *b*. The group had developed into a great storm centre. The principal mass was not in the van. It was closely followed by a large normal spot, which I have included in the group. The normal spot showed cav ty foreshortening. The group was surrounded by faculæ.

September 28th, 1910, at $2^h\ 30^m$ p.m. G.M.T.

Group 59.	*p.* Lat.	19°·6, S.	Long. 51°	Type III. *b*, 7.
	f. ,,	11°·1, S.	,, 50°	

Two chief members of group observed for position.

September 30th, 1910, at $3^h\ 5^m$ p.m. G.M.T.

Group 59.	*p.* Lat.	12°·3, S.	Long. 59°·6	Type III. *b*, ± 34.
	m. ,,	14°·2, S.	,, 45°·6	
	f. ,,	18°·2, S.	,, 40°·6	

A stupendous disturbance, 114,100 miles long. The group consisted of wildly irregular umbræ in a great region of shattered penumbral matter. Principal spot, 48,600 miles in diameter.

October 3rd at $0^h\ 55^m$ p.m. G.M.T.

Group 59.	*p.* Lat.	12°·4, S.	Long. 62°·6	Type III. *b*, ± 40.
	p. Prin. ,,	14°·9, S.	,, 48°·4	
	f.(1) ,,	15°·4, S.	,, 45°·4	
	f.(2) ,,	19°·4, S.	,, 44°·8	

Still a great disturbance, consisting of wild penumbral matter containing a good many umbræ, none of which, however, was of great size. Leader IV. *c* to IV. *a*. The largest spot was near the *f*. extremity of the group and on this date the disturbance showed evidence of subsidence.

October 4, 1910, at 0^h 25^m p.m. G.M.T.

Group 59.	*p*.	Lat. 12°·6, S.	Long. 61°·5	Type III. *b*, ± 30.
		„ 12°·6, S.	„ 60°·4	
	Prin.	„ 13°·4, S.	„ 48°·4	
	Prin.	„ 13°·9, S.	„ 46°·4	

The leader consisted of 2 largish umbræ. The largest spot in the group was more or less in the middle of the train and seemed to have a more definite shape. The *f*. member was a double umbra with fragmentary penumbral matter N.*p*.

October 5th, 1910, at 1^h 16^m p.m. G.M.T.

Group 59.	*p*.	Lat. 12°·4, S.	Long. 61°·5	Type IV. *b*, ± 30.
		„ 12°·4, S.	„ 60°·7	
	Prin.	„ 14°·2, S.	„ 48°·7	
		„ 18°·6, S.	„ 43°·7	

The leader consisted of 2 irregular umbræ ; the principal spot was a large irregular mass of penumbral matter with 4 large and many smaller umbræ in it.

There was a great photospheric inundation, like a huge tongue of white flame, extending halfway over the disturbance from N.*p*.

October 6, 1910, at 2^h 5_m p.m. G.M.T.

Group 59.	*p*.	Lat. 12°·4, S.	Long, 61°·1	Type III. *b*, ± 35.
	Prin.	„ 13°·9, S.	„ 48°·1	
	f.	„ 18°·6, S.	„ 43°·6	

Still a great disturbance. More active looking, and consisting of about 23 principal umbræ and numerous dots. The *p*. portion 4*ss*. in a train. The principal was a little *f*. the middle of the group. A wild irregular penumbral mass with three large and smaller umbræ in it. It was divided by a photospheric inundation. The whole group in faculæ.

October 7, 1910, at 1^h p.m. G.M.T.

Group 59.		Lat. 12°·4, S.	Long. 61°·4	Type III. *b*, 17, principal.
„	Prin.	„ 14°·3, S.	„ 47°·4	
„	*f*.	„ 18°·3, S.	„ 45°·4	

Contained 17 principal umbræ and many smaller ones, and was in a great and bright faculous area.

October 8, 1910, at 12·53 p.m. G.M.T.

Group 59. Lat. *p*. 13°·9, S. Long. 46°·4. Type III. *b*. Query as to number of members. Bright faculous wisps extended S. to a great distance.

[Mr. Strachan's Group 59 has been measured as two separate groups—Nos. 6,893 and 6,894—in the Greenwich series.]

5. Determination of Heliographic Latitudes and Longitudes of Spot-Groups observed in the Years 1913 and 1914.

By WILLIAM BARNETT, F.R.A.S.

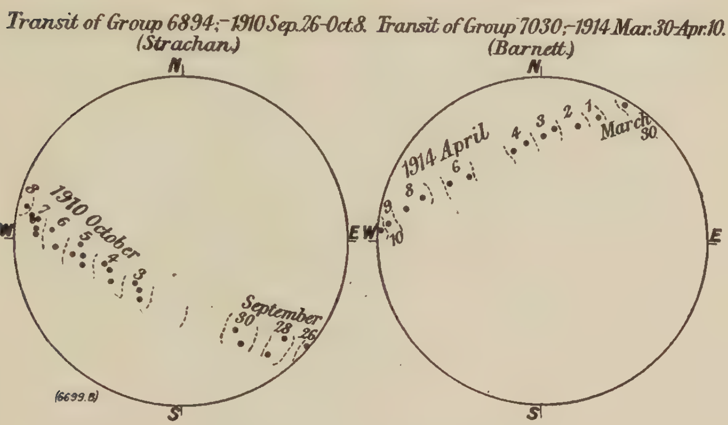
The following observations were made at Rosario, Argentine Republic, with an equatorially mounted and clock-driven refractor, 4 inches in aperture, by projection on a screen, the solar disc being made to coincide with a circle 6 inches in diameter, and the positions of the sunspots being read off by means of "Stonyhurst discs":—

Greenwich No. of Spot group.	Day.	Local Time.	Type. (*See* Appen. II.)	Remarks.	Heliographic Latitude.	Heliographic Longitude.
	1913	h m			°	°
7008	Jan. 1	8 10	I.	Round spot in bright faculæ.	+28	56
	2	8 0	I.	Disappearing - (No spots visible from Jan. 3 to Feb. 20).	+?	53
7012	Feb. 20	11 12	I.3.*s.d.*	Small spots in faculæ.	+31	26
	22	8 45	I.	Very far North -	+33	32
	24	9 10	I.	—	+30	26
	25	10 40	I.	—	+31	24
	26	11 12	I.2.*s.d.*	—	+33	27
7015	Apr. 5	9 55	I.2.*s.s.*	Small spots - - (June 6th visited England. Returned Dec. 3).	— 2	231
7021	Dec. 9	8 48	I.7.*s.d.*	Group of small spots.	—23	160
	10	9 27	I.8.*s.d.*	Group of small spots.	—25	158
	11	10 25	I.8.*s.d.*	Spotlets very weak, the tail opening out.	—23	159
	12	10 34	I.4.*s.d.*	Almost disappeared	—21	158
7022	Dec. 30	8 16	I.10.*s.d.*	—	+25	235
	31	8 22	I.3.*s.d.*	Group disminishing.	+21	232
	1914					
	Jan. 1	8 35	I.5.*s.s.*	—	+21	238
	2	8 42	I.5.*s.s.*	Small spots with penumbra.	+22	239
7025	Feb. 2	8 33	I.7.*s.s.*	—	—11	180
	4	8 17	I.4.*s,s.*	—	—13	177
	5	8 40	I.2.*s.s.*	Group almost disappeared. (Absent in Chile till 6 March). (Faculæ seen Feb. 6 and March 27. No spots visible through March).	—12	184

Greenwich No. of Spot group.	Day.	Local. Time.	Type. (*See* Appen. II.)	Remarks.	Heliographic Latitude.	Heliographic Longitude.
	1914	h. m.			°	°
7030	Mar. 30	9 46	IV.	One large spot appearing.	+30	68
	Apr. 1	8 33	IV.*b.*	Fine spot, followed by 3 small ones in faculæ	+37	76
	2	8 24	IV.*c.*	Fine group, followed by bright faculæ.	+27	75
	3	8 31	IV.*c.*	Group increased, followed by bright faculæ. Remarkable change dividing big spots.	+28	72
	4	8 27	II.*c.*	Further apart -	+29	61
	6	9 50	II.*a.*	Extensive penumbra, great development.	+28	76
	8	12 5	II.*a.*	Group diminishing	+29	73
	9	8 30	II.*c.*	Group surrounded by bright faculæ.	+27	69
	10	8 10	II.*a.*	Leader disappearing. Rear spot surrounded by bright faculæ.	+28	64
7032	Apr. 17	9 39	I. 6 *ss.*		—23	246
	18	10 37	I. 7 *ss.*		—23	243
	20	9 32	I. *s.d.*	One small spot -	—24	241
7033	Apr. 20	9 32	I. 4 *ss.*	Four small spots in bright faculæ.	—25	291
7036	Apr. 27	9 6	III. *a.*	Leader fine spot -	+18	142
	28	9 6	III. *a.*	Extensive penumbra. Group developed.	+17	150
	30	9 31	III. *a.*		+19	137
	May 1	8 55	—	Rear spot surrounded by faculæ.	+17	136
	2	8 28	III. *a.*	Group disappearing, surrounded by faculæ.	+18	138
7038	Apr. 28	9 6	I 3 *s.d.*	Three spots appearing in bright faculæ.	+24	66
	30	9 31	I. 5 *s.d.*	Five small spots in faculæ.	+24	58
	May 1	8 55	I. 3 *s.d.*		+23	56
	2	8 28	I 3 *s.d.*		+25	48
7046	June 9	10 45	I. 2 *s.s.*		+27	255
	11	10 5	I. 1 *s.s.*		+24	254
7047	June 16	12 0 *c.*	IV. *d.*	A new group -	—23	204

For the sake of comparison the corresponding results as they appear in the Greenwich Sunspots Ledgers are given below. It must be borne in mind that the method of measurement by the use of the Stonyhurst discs is only intended to give a first approximation to the heliographic positions of the objects measured, that

the Greenwich Ledgers give the mean weighted positions of the spot-groups taken as a whole, while Mr. Barnett's figures refer to selected members of the group, and that on the average



Paths of Groups 6894 and 7030 in Transit, as seen by projection.

the Greenwich observations were made four hours earlier than those at Rosario, in Lat. 32° 55′ S., Long. 60° 33′ W., Diff. in time $4^h\ 2^m\ 12^s$.

Greenwich No. of Group.	Day.	Gr. Civil Time.	Remarks.	Heliographic Latitude.	Heliographic Longitude.
	1913.	h. m.		°	°
7008	Jan. 1	8 59	A short stream of spots.	+26·2	54·4
	2	10 17		+26·5	53·5
7012	Feb. 20	15 15	A regular spot with train in high latitude.	+31·4	24·3
	22	9 10		+31·1	25·6
	24	11 10		+31·4	26·3
	25	9 24		+31·3	26·1
	26	10 56		+31·0	25·5
7015	Apr. 5	11 56	A short stream - -	— 2·0	229·9
7021	Dec. 9	8 25	A fairly stable spot, *a*, with several short-lived companions, of which one, *b*, appears in advance of *a* on December 13, and remains alone on December 14.	—24·1	155·8
	10	7 52		—23·7	157·2
	11	10 7		—24·1	157·1
	12	12 56		—23·5	157·6
7022	Dec. 30	11 5	A pair of double spots varying their distance from each other, with occasional companions.	+22·7	234·1
	31	11 7		+22·2	235·2

Greenwich No. of Group.	Day.	Gr. Civil Time.	Remarks.	Heliographic Latitude.	Heliographic Longitude.
	1914.	h. m		°	°
7022	Jan. 1	10 42		+22·5	237·1
	2	12 14		+22·5	238·7
7025	Feb. 2	11 40	A short stream of small spots.	−12·8	178·8
	4	11 40		−12·2	178·8
	5	9 31		−12·4	179·1
7030*	Mar. 30	8 56	A large continuously active spot-group. The main spot, *a*, soon breaks up into an increasing number of components—the most important being *b* and *c*—which form a stream covering 12° in longitude on April 6. After this date they diminish in number, only the rearmost spot remaining visible on April 11, close to the limb.	+29·0	74·0
	Apr. 1	8 17		+28·2	72·7
	2	9 17		+28·3	72·9
	3	8 29		+28·2	72·6
	4	13 17		+28·8	73·6
	6	8 41		+27·9	72·5
	8	8 31		+27·8	72·1
	9	8 31		+27·7	71·2
	10	8 26		+28·5	70·1
7032	Apr. 17	8 58	A succession of small short-lived spots varying in relative importance.	−23·3	243·2
	18	8 26		−23·3	242·8
7033	Apr. 20	8 23	A pair of small unstable groups.	−25·2	290·9
7036	Apr. 27	12 41	A fine stream of active spots of rapid development. The leader spot, *a*, continues to be the most important member, as the rear of the stream soon disappears. *a*, the umbra of which is frequently crossed by bright bridges, is measured in two portions on April 29.	+18·5	138·5
	28	9 13		+18·7	137·8
	30	9 12		+18·6	137·5
	May 1	7 38		+18·1	137·4
	2	12 57		+18·6	137·2
7038	Apr. 28	9 13	A group of spots appearing on the east limb and showing signs of dying activity.	+25·9	57·2
	30	9 12		+25·3	55·8
	May 1	7 38		+25·3	55·5
	2	12 57		+25·6	54·1
7046	June 9	12 56	A stable spot with small evanescent companions.	+28·3	251·1
	11	7 16		+28·9	250·0
7047	June 16	10 52	A small group developing into a stream of normal type.	−22·1	202·5

* *See* Plate II. B.

6. Summary of Sunspot-groups for November, 1915.

By WILLIAM STRACHAN, F.R.A.S.

[The Rev. A. L. Cortie, S.J., F.R.A.S., Director of the Solar Section from 1899 to 1911, drew up a convenient and compact form for a monthly summary of the solar spots and faculæ for use in his Solar Report for the year 1899 (*Memoirs*, Vol. XI., Part II.). Mr. Strachan here gives an example of this form as adopted by him in his own records. He writes: "The positions were principally obtained by the use of a rough reticulated micrometer photographed on glass, the resulting positions being finally measured with the Stonyhurst discs. Some of the work was done by projection and a few of the diagrams were drawn from measures of my small solar negatives superposed on squared paper. The images on these plates are about $2\frac{1}{8}$ inches in diameter."]

Life-histories of Sunspots. Groups and Types. Nov., 1915.

Day.	Spot Groups and Types.				Faculæ.
2	136	137	138		Faculæ N.W. W. and E. bright
..	IV*c*.	III*a*.	III*a*.		
5			III.		Faculæ W.
6			III*a*.	139	Faculæ W. by N.
"				IV*a*.	Faculæ N.W. S.E. large area far in. Bright veins and detached patches.
10	140	141		IV*c*.	
"	III.	III*a*.			
14	III*a*.		142		Faculæ N.W.
"			Ring.		
17			III*a*.	143	Faculæ N.N.W.
"				I.	
19	144	145	146	II*b*.	Faculæ E.S.E. E. large area.
"	III.	I. 8*s.s.*	III*a*.		
25	147	148			Faculæ E. small. W.N.W.
"	III*a*.	IV*a*.			
26	149		150	151	Faculæ S.E. S.W. W. small.
"	I. 1*s.s.*	IV*c*.	II*a*.	III.	
27		IV*e*.	III.	III.	Faculæ W. E.

Calendar.

Day.	Numbers of Spot-groups.	Total Number of			Remarks.
		Spot-groups.	Spots.	Faculæ.	
Nov.					Group 139 on Nov. 6. Entire spot: minor axis $\frac{1}{4}$. Umbra: major axis $\frac{3}{5}$; minor $\frac{1}{20}$. Penumbra: *p*, insensible; *f*, slightly more than $\frac{1}{20}$. All expressed in terms of major axis of entire spot.
2	136, 137, 138	3	33	3	
5	138	1	±20	1	
6	138, 139	2	5	1	
10	140, 141	3	23	4	
14	140, 141, 142	2		1	
17	142, 143	2		1	
19	143, 144, 145, 146	4	14	2	
25	147, 148	2	5	2	
26	148, 149, 150, 151	4	10	2	
27	148, 150, 151	3	About 35	2	

Mean Positions of the Spot-groups.

Mr. Strachan's Observations.				Greenwich Sunspot Ledgers.			
Reference Number of Group.	Days of Observ-ation.	Mean Heliographic Position.		Reference Number of Group.	Days of Observa-tion.	Mean Heliographic Position.	
		Long.	Lat.			Long.	Lat.
136	1	69°	+21°	7488	14	69°·6	+19°·7
7*p*	1	88	+26	7495*a*	6	86·2	+26·5
f	1	78	+29	*b*		79·1	+28·1
8*p*	3	29	−20	7492*a*	10	28·7	−19·9
f	3	22	−21	*b*		21·9	−21·1
9	1	251	−15	7510	9	253·4	−15·3
141*p*	2	268	+21	7512*a*	9	271·2	+20·0
f	2	264	+24	*b*		264·9	+21·8
3	2	161	−15	7521	2	161·3	−11·3
				7523	6	159·5	−17·1
4*m*	1	182	−21	7516	9	180·5	−21·7
5	1	122	+22	7525	3	112·5	+22·4
6	1	102	−23	7526	13	100·5	−22·6
7	1	163	+10	7517	11	161·0	+11·7
8	3	98	−23	7526	13	99·1	−23·0

Mr. Strachan did not obtain any measures for his groups Nos. 140, 141, 149, 150 and 151. No. 148 was taken in the Greenwich Series as the same group (No. 7526) as No. 146, while No. 143 was regarded as constituting two distinct groups, Nos. 7521 and 7523.

The Greenwich heliographic positions in the above table are given for the same days as those on which Mr. Strachan's observations were made.

THE WILSONIAN EFFECT.—"Regular" spots, that is to say, spots of well-defined outline and circular form (when due allowance has been made for foreshortening), afford an opportunity for testing the relative levels of the penumbra and umbra when they are seen near the limb of the Sun. It is much to be desired that Members would observe these regular spots (Type IV.) on all possible occasions, and the form of observation recommended is that adopted by Mr. Strachan in the case of Group 139, on Nov. 6, 1916, and recorded at the foot of p. 39. The major axis of the entire spot is taken as unity, and all other lengths are expressed as fractions of it. The dimensions to be recorded in this way are the three portions of the major axis and the corresponding three portions of the minor axis, namely, the dimensions of the umbra and of the two portions of the penumbra lying beyond it, in each direction.

7. The Solar Activity of 1919.

By CHARLES MAURICE DU MARTHERAY.

"The observations of 1919 show that a sensible diminution has taken place in the solar activity, and that a progress has already been made towards the minimum; but the Sun has manifested such energy in several revivals as to prove that we are still near the maximum period of the cycle.

"The maximum for the year 1919 was reached in June, from the 17th to the 23rd, and a secondary maximum was developed in August.

"There were 155 distinct groups of spots observed and 304 groups of faculæ, the distribution of which in latitude is shown below. The numbers of the faculæ are much less certain than those of the spot-groups, since they cannot be followed from one limb to the other, and also because they change rapidly in latitude and in shape.

"At the beginning of the year the Northern and Southern hemispheres were nearly equal in activity, but from the month of July onward the activity in the Southern hemisphere became the greater. North latitude 13° and South latitudes 10° and 18°–20° were particularly disturbed. Sunspots showed increasing tendency to appear in lower latitudes.

"In the beginning of August there were several magnetic disturbances; also auroræ borealis, and afterwards luminous phenomena opposite the Sun were seen.

Distribution in Latitude of Spots and Faculæ in the Year 1919.

Northern Hemisphere.			Southern Hemisphere.		
Latitude.	Spots.	Faculæ.	Latitude.	Spots.	Faculæ.
°			°		
+ 30	—	2	— 30	—	1
+ 29	—	1	— 29	—	0
+ 28	—	0	— 28	—	1
+ 27	—	0	— 27	—	0
+ 26	—	0	— 26	—	1
+ 25	—	1	— 25	—	2
+ 24	2	2	— 24	—	2
+ 23	0	3	— 23	—	1
+ 22	1	2	— 22	2	4
+ 21	1	1	— 21	0	3
+ 20	1	6	— 20	7	25
+ 19	1	3	— 19	3	5
+ 18	0	5	— 18	12	20
+ 17	2	6	— 17	7	9
+ 16	1	2	— 16	6	9
+ 15	4	5	— 15	5	9
+ 14	3	8	— 14	6	6
+ 13	6	12	— 13	1	5
+ 12	4	10	— 12	0	4
+ 11	5	7	— 11	3	10
+ 10	2	5	— 10	11	17
+ 9	3	7	— 9	9	11
+ 8	6	7	— 8	5	6
+ 7	7	7	— 7	5	7
+ 6	2	5	— 6	3	7
+ 5	4	8	— 5	0	2
+ 4	2	4	— 4	4	2
+ 3	5	7	— 3	1	3
+ 2	1	3	— 2	0	1
+ 1	2	1	— 1	0	1
+ 0	0	0	— 0	0	0
Total -	65	130	Total -	90	174

Total number of groups of spots = 155
" " " " " faculæ = 304.

Note.—The columns headed "Latitude" give the mean latitude of each group of spots and faculæ.

"On the following dates there were interesting phenomena on the Sun's disc :—

"April 6.—Large groups of faculæ on the same meridian.
"June 7.—A maximum of spotted area.
"June 23.—A maximum of number of groups.
"August 19.—Transit across the central meridian of a large equatorial group.
"September 10.—A very disturbed meridian in the eastern hemisphere.
"Several groups had a duration of 2–3 returns. The most important was, without doubt, that of August, 1919, in the low latitude of $+ 2°\cdot5$ to 3°. The following table gives some features of its history :—

——	Spot number.*	Date, 1919, and Hour.	Length of rotation.	Remarks.
			Days.	
Probable birth -	82	July 26, morning	—	Very small : with faculæ.
1st appearance at the limb.	95	Aug. 12, evening -	—	Large spot.
1st transit across central meridian.	"	" 19, $3^h\ 0^m$ - -	—	Large group.
2nd " "	116	Sept. 14, $22^h\ 0^m$ -	26¾	Round spot.
3rd " "	127	Oct. 11, evening -	27	Small round spot.
4th " "	142	Nov. 8, morning -	27¼ (delayed)	Small round spot.
5th " "	149	Dec. 5, noon - -	27½ (delayed)	Very small spot.

"This spot, therefore, lasted for about 140 days, or nearly five months. Its maximum area having been attained on Aug. 20, it took 26 days to reach its full development, and 112 to disappear, or about five times as long. The study of a great number of groups has proved to be of great interest† ; the following may be specially mentioned :—

"(1) Group 1† ; February.—Two spots in the same latitude ; interesting changes in the chief spot. (Meridian passage, Feb. 14.) *See Bull. Soc. Astr. de France*, 1919, May.

"(2) Group 28 ; May.—Spot of long duration. (Meridian passage, May 9.)

"(3) Group 31 ; May.—Followed throughout its entire apparition. A large spot with a double gyratory movement. (Meridian passage, May 19.) (*See* p. 44.)

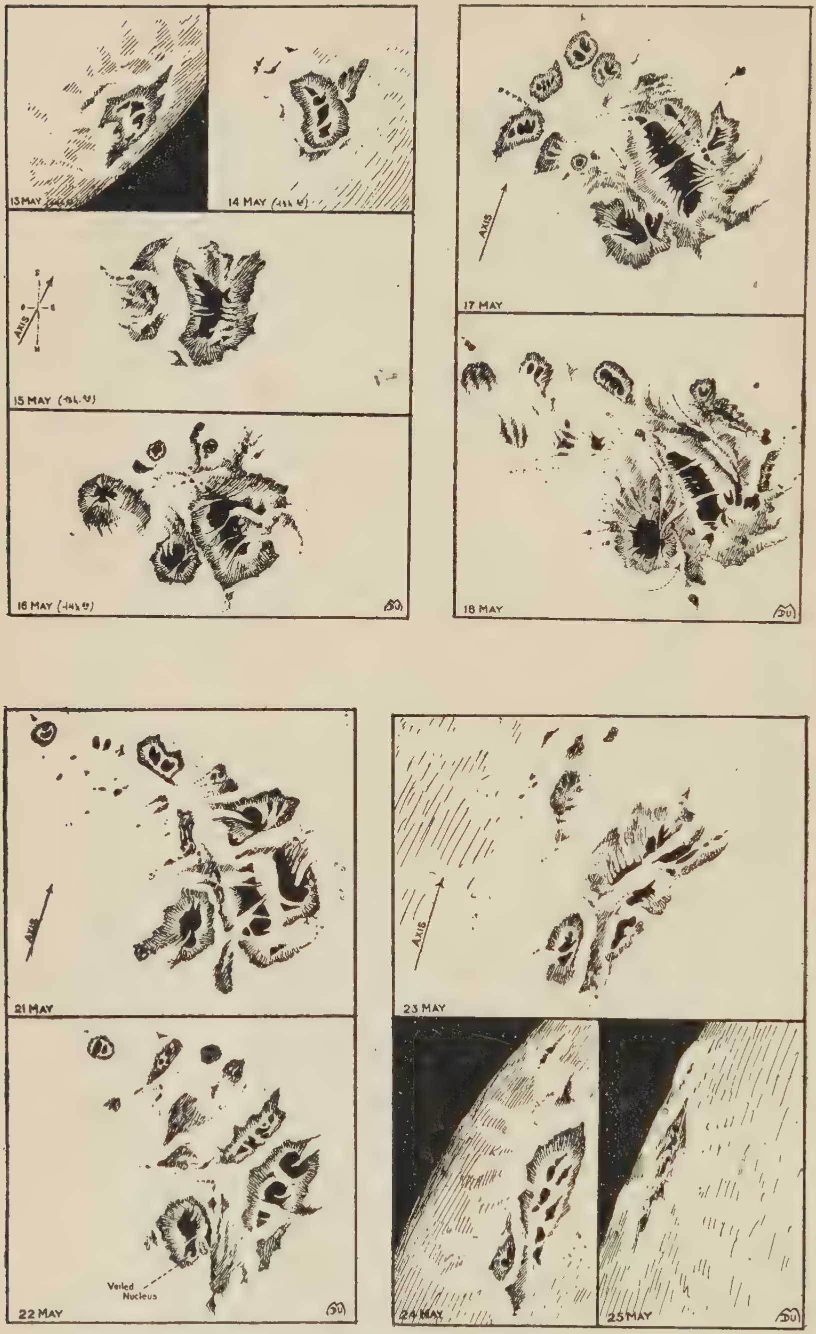
* M. Du Martheray's numeration.

† M. du Martheray would be pleased to place his complete observations of these at the disposal of colleagues who would wish to study them.

TABLE.—*Solar Statistics for* 1919.

1919. Month.	Spots. Monthly Totals. Number of Spots. N.	S.	N.+S.	Spotted Area.(b) N.	S.	N.+S.	Days of Observation.	Details seen with Naked Eye.(c)	Daily Means. Number of Spots. N.	S.	N.+S.	Spotted Area.(d) N.	S.	N.+S.	Have crossed the disc of ☉ (e) Number of (different) Groups.	Spots.	Faculæ. Monthly Totals. Number of Faculæ. N.	S.	N.+S.	Faculous Area. N.	S.	N.+S.
Jan.(a)	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Feb.	—	—	—	—	—	—	—	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mar.	82	34	116	355	104	459	12	3	7	3	10	30	8	38	12	41	15	16	31	826	422	1,248
Apr.	39	43	82	54	129	183	11	2	3	4	7	5	12	17	11	43	25	17	42	642	754	1,396
May	131	170	301	1,137	336	1.473	23	3	6	7	13	49	15	64	11	55	24	31	55	2,191	949	3,140
June	258	239	497	688	853	1.541	28	3	9	8	17	25	30	55	31	123	49	43	92	1.354	1.467	2,821
July	66	138	204	80	350	430	27	0	2	5	7	3	13	16	19	55	38	46	84	827	1,141	1,968
Aug.	97	232	329	461	629	1,090	29	3	3	8	11	16	22	38	24	81	37	92	129	889	1,682	2,571
Sept.	67	214	281	277	341	618	28	5	2	8	10	10	12	22	16	56	26	69	95	350	1,406	1,756
Oct.	19	46	65	52	62	114	10	1	2	4	6	5	6	11	12	32	7	17	24	172	277	449
Nov.	46	10	56	56	13	69	(f)9	1	5	1	6	6	1	7	9	21	5	8	13	56	129	185
Dec.	27	21	48	8	15	23	7	3	4	3	7	1	2	3	8	20	12	9	21	189	167	356
Totals for the Year	832	1,147	1,979	3,168	2,832	6,000	184	28	—	—	—	—	—	—	155	527	238	348	586	7,496	8.394	15.890

(a) On account of illness no observations were made in January and February.
(b) Provisional estimates.
(c) Number of different spots observed with the naked eye during the month.
(d) Daily means of spotted area.
(e) Number of different groups and spots that have taken their rise on the visible surface during the course of the month.
(f) On one of these days the Sun, which was observed by projection in a slightly veiled sky, appeared quite free from spots.



The great Sunspot of 1919 May.

"(4) Group 45 ; June.—Return of Group No. 31. Group of long duration. Typical case of segmentation by covering up. (Meridian passage, June 15.)

"The study of the changes of detail in a spot, *carried on for several hours*, very fatiguing though it is, is a research of the greatest usefulness, and is still too much neglected. May it not be that it is only by such an attentive study that we shall one day reach a better understanding of the photospheric mechanism, and so, with the help of the spectroscope, decipher one day the solar problem ?"

Nyon, Switzerland. MAURICE DU MARTHERAY.

The drawings by M. du Martheray, reproduced on the opposite page, illustrate the great sunspot of May 1919. Those of May 13–16 show the rapid development of the penumbra, the many bright bridges, the principal and secondary spots, and the numerous small spots. On May 17–18 the penumbra is greatly divided, and there are numerous currents in the photosphere ; on the 18th there is a double gyratory movement in opposite directions. The drawings on May 19–20 are not reproduced, but on these days the penumbra is less disturbed, though the double gyratory movement is very pronounced. On May 20 the nucleus of the secondary spot is partially hidden by a reddish veil. By May 21–22 the penumbra is simplified, and the small spots are scattered or disappear. By May 25 the spot is close to the limb, and the faculæ show up as a real elevation projected beyond the edge of the Sun.

[The Director received a special report upon "The Solar Activity of 1919" from M. Maurice Du Martheray, Life Member of the Association, a translation of which, in an abridged form, is given above. Unfortunately illness prevented M. Du Martheray from observing during the months of January and February ; hence only the last ten months of the year are represented. The observations were made at Nyon, Switzerland, by means of an equatorial refractor, 60 mm. (= 2·4 inches) in aperture ; first, by projection, and then, for the details of the spots, by direct observation. Observations were made daily as accurately as weather and leisure permitted. The results of the observations are combined in the table on p. 43.]

8. The Distribution of Faculæ between the Four Quadrants of the Sun's Apparent Disc.

At the meeting of the British Astronomical Association held on May 29, 1907, Mrs. Walter Maunder gave an account of a paper entitled "An Apparent Influence of the Earth on the Numbers and Areas of Sunspots in the Cycle 1889-1901," which showed that there was "a well-marked and steady preponderance of the eastern half of the Sun's disc over the western half, both as to the areas of the spots and as to the numbers of the separate groups." (*M.N.*, Vol. LXVII., pp. 451–476.)

At first sight it would seem to be absurd to suppose that the Earth could possibly have any real effect upon the Sun, seeing that the Earth is relatively so small and so far away from it. There are two facts which have always to be kept in mind in

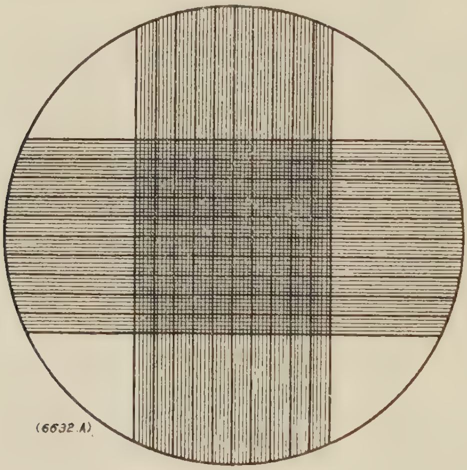


FIG. 1.—Diaphragm for the Measurement of the Areas of Spots and Faculæ.

the study of sunspots: first, that sunspots are very small as compared with the Sun; next, that sunspots are very large as compared with the Earth. Thus the largest group of spots ever photographed at Greenwich covered at its greatest extent only one part in 250 of the area of the hemisphere turned toward us, and it retained that extent only for a couple of days. On the other hand that group had an area of over 4,000 millions of square miles; that is to say, it was about a thousand times as large as Europe.

But however unlikely such a result might seem, the paper, just referred to, showed that the examination of a great mass of statistics yielded evidence of a systematic inequality between the eastern and western halves of the apparent disc of the Sun, both as regards the numbers of spot groups observed and the total areas which they covered.

DESCRIPTION OF THE GREENWICH SOLAR MICROMETER.

The measures of the photographs of the Sun, taken at Greenwich, are made with a large position micrometer, specially constructed for the purpose. In this micrometer the photograph is held with its film side uppermost on three pillars mounted on a circular metal plate. This plate can be turned through a small angle about the pivot in its circumference by means of a screw and antagonistic spring acting at the opposite extremities of a diameter. The pivot of this plate is mounted on the circumference of another circular plate which can also be turned by screw action about a pivot in its circumference, 90° distant from that of the upper plate, this pivot being mounted on a circular plate with a position circle which rotates about its centre. By this means small movements in two directions at right angles to each other can be readily given to the photograph, which is thus accurately centred with respect to the position circle. When this has been done, a positive eyepiece having at its focus a glass diaphragm, ruled with cross-lines into squares, with sides of one-hundredth of an inch (for measurement of areas) is moved along a slide diametrically across the photograph, the diaphragm being nearly in contact with the photographic film so that parallax is avoided. The distance of a spot or faculæ from the centre of the Sun—that is to say, from the centre of rotation of the position circle—is read off by means of a scale and vernier to the tenth of a millimetre (corresponding to one-thousandth of the Sun's radius for photographs having a solar diameter of one decimetre). The position angle is read off on the position-circle which rotates with the photographic plate. (*See* Fig. 1, opposite, and Plate III.)

In measuring a photograph, the image of the Sun is centred as accurately as possible by rotation, the plate being moved by the two tangent screws just mentioned. The position-circle is then set to the reading 0°, and to each 90° therefrom, and the scale readings are taken for both limbs at each of the four settings; the scale is so adjusted that its zero coincides with the centre of rotation of the position-circle, so that the mean of the eight readings for the limb gives the mean radius of the Sun directly.

In the principal focus of the photoheliograph are two cross spider-lines (*see* Plate I.), the images of which appear on every photograph. The position-angles of these cross-lines from the north point of the plate are carefully determined by observations made with the photoheliograph for that special purpose, and, these being known, the actual position-circle readings made with the micrometer on these cross-lines can be at once corrected to true position-angles from the north point. The point, therefore, to which attention is given in placing the photograph in the micrometer is that it is truly centred; the position-angle of the plate does not matter, as in the course of the reduction of the measures the position-angles, as read, are corrected to true position-angles from the north point by applying a correction deduced from the readings of position of the cross-lines. These constants of the radius and position-angle having been determined

for the photograph, the magnifier is moved over the plate, the various markings, spots or faculæ, are picked up, their positions in distance and angle are read, and the number of squares of the diaphragm which they cover are counted. Two complete sets of measures are made by two separate observers, of whom the one measures with the magnifier on the right of the centre of the instrument and the other measures on the left, the means of the two sets of readings being used in the reduction.

The description of the method by which the photographs of the Sun are measured has been given in so much detail in order to show, not only that the two measurers work independently of each other, but also that both of them are ignorant of the true position-angles of the objects measured. It is only in the course of the after-reduction that these are ascertained. To the one measurer the part of the circumference of the Sun that he is measuring—the east limb as well as the west—is always on his right hand; to the other measurer it is always on his left hand.

Description of the Greenwich Photo-Heliographic "Daily Results."

For the first twelve years of the Photo-Heliographic work at Greenwich the measures of the spots and faculæ on the solar photographs were exhibited, after reduction, in the form of a *Journal*. That is to say, the positions of all the objects measured separately on the Sun, whether spots or faculæ, were given in two forms. First, with reference to the centre of the Sun's apparent disc, as distance from the centre expressed in terms of the Sun's radius, and position angle from the north pole of the Sun's axis, measured in the direction N.E.S.W.N. Next, as longitude and latitude on the Sun, as referred to an adopted position of the Sun's equator and a prime meridian. The areas of both spots and faculæ were expressed in millionths of the Sun's visible hemisphere; that is to say, the measures as actually made on the photograph were corrected for foreshortening. In the measures of the spots a distinction was made between the umbra or darker central portion, and the area of the whole spot, including the umbra.

The groups of spots are given a current number in the order of their appearance. Faculæ are not numbered, but are divided into two classes: those associated with spots and those distinct from spots. The areas of the former are inserted in the last column of the table, but in the same line of the page as the spot group with which they are associated; no separate measures of their positions on the Sun are given, but a letter is added to indicate their bearing relative to their associated spots. These letters are *n*, *s*, *p*, *f*, *c*, denoting respectively *north*, *south*, *preceding*, *following*, *concentric*. The positions of the faculæ which are apart from spots are given before those of any of the spots if they are near the west limb, after all the spots if near the east limb; the spots themselves are given in order of diminishing longitude.

The last line of each day gives the month and day of the month, civil reckoning, the position of the Sun's axis from the

north point, the heliographic longitude and latitude of the centre of the disc, and the total area for the day of the umbræ, whole spots, and faculæ.

The following is an extract from the Photo-Heliographic Results for 1915, showing the *Daily Results* or *Journal* for May 26 :—

Extract from the Photo-Heliographic "Daily Results."

Greenwich Civil Time.	Measurers.	No. of Group, and Letter for Spot.	Distance from Centre in terms of Sun's Radius.	Position Angle from Sun's Axis.	Heliographic Longitude.	Heliographic Latitude.	Spots. Area of Umbra for each Spot (and for Day).	Spots. Area of Whole for each Spot (and for Day).	Faculæ. Area for each Group (and for Day).
1915.				°	°	°			
145·319	N, VD		0·808	233·3	29·1	−29·6			84
		7279*a*	0·352	5·5	339·1	+19·2	7	32	
		7280	0·416	24·6	330·5	+20·8	2	5	
		7281*a*	0·429	39·7	324·4	+18·0	6	10	
		7281*b*	0·451	42·8	322·4	+18·0	2	6	
		7282	0·509	42·9	319·5	+20·5	0	11	
		7282	0·523	44·9	318·0	+20·5	0	36	
		7282	0·537	43·3	317·8	+21·7	2	13	
		7282	0·552	44·7	316·5	+21·8	3	6	
	G.	7282*b*	0·546	46·7	316·0	+20·8	20	153	
		7282*a*	0·585	47·5	313·5	+22·1	89	424	
		7282	0·581	51·9	312·2	+19·7	2	5	
		7282*c*	0·607	51·6	310·6	+21·0	5	40	
		7282	0·604	55·1	309·6	+19·0	3	8	
		7285*a*	0·812	63·3	290·4	+20·7	15	111	137*c*
			0·865	121·9	285·1	−27·9			136
			0·920	62·3	277·6	+24·7			407
			0·914	110·1	276·3	−18·8			148
May 26				(−17·9)	(341·1)	(−1·3)	(156)	(860)	(912)

In the year 1882 the writer first made the suggestion that the measures of the solar photographs should not only be given day by day as in the *Daily Results*, but that the measures for each group of sun-spots should be collected together for its whole time of visibility in a sort of *Ledger*, so as to bring out its development and life-history. These *Ledgers* were first printed for the year 1886 and have been since then published regularly, year by year with the *Daily Results.** By that date an approximately uniform scale had been adopted for the solar photographs both at Greenwich and

* The *Ledgers* for the twelve earliest years—1874 to 1885—were not published until 1907, when they were all brought out in one volume. The *Daily Results* for the first four of these years were reprinted in the same volume ; and those for the next four years (but in a very imperfect condition) at another time, by the Solar Physics Committee. The last four years had undergone much less addition and hardly required republication, but the Director of the Section had necessarily to deal with this portion of the material almost entirely unaided.

in all the collaborating observatories, from which photographs of the Sun were sent to Greenwich for measurement and inclusion in the general series. The following extract exhibits the form in which these *Ledgers* are printed. It explains itself for the most part, but it should be pointed out that in the first column the time when the photograph was taken is expressed by the day of the year and the decimal of the day, instead of in hours and minutes; the place is indicated by its initial letter, *G.* standing for *Greenwich*, *D.* for *Dehra Dun*, and *C.* for the *Cape.* The last column is for our present purpose the most important: it gives the longitude of the centre of the group from the central meridian of the Sun, day by day, the longitude being reckoned negative on the east of the central meridian and positive on the west of it.

Extract from the Photo-Heliographic Sunspot "Ledger."

Group 7282.

May 22–June 3. Return of Group 7266. A remarkable group, consisting chiefly of a very large regular spot, *a*, with two regular spots close to it, *b* and *c*; the one *sp* and the other *sf*. A great number of small unstable spots form and disappear within a wide area round these three chief spots.

Date. Greenwich Civil Time, and Where taken.	Projected Area of		Area Corrected for Fore-shortening of		Mean Longitude of Group.		Mean Latitude of Group.	Longitude from Central Meridian.
	Umbra.	Whole Spot.	Umbra.	Whole Spot.	System I.	System II.		
1915.					°	°	°	°
141·430 G	61	294	160	760	315·4	320·6	+21·7	−77·2
142·331 G	69	454	100	636	314·1	319·4	+21·7	−66·6
143·297 G	123	684	118	646	313·6	318·9	+21·6	−54·3
144·315 G	150	847	107	609	314·2	319·5	+21·6	−40·2
145·319 G	201	1129	124	696	314·3	319·7	+21·6	−26·8
146·320 G	213	1146	120	646	313·8	319·2	+21·5	−14·1
147·260 D	184	950	101	516	312·5	317·9	+21·9	− 2·9
148·362 C	142	946	79	522	311·8	317·3	+21·9	+10·9
149·330 G	141	803	84	483	311·4	316·9	+22·0	+23·4
150·305 G	122	621	83	415	311·1	316·7	+22·2	+36·0
151·310 G	79	427	66	354	310·5	316·1	+22·2	+48·7
152·554 G	42	269	54	346	310·3	315·9	+22·3	+64·9
153·365 C	19	157	41	340	310·0	315·7	+22·2	+75·3
Means - -	—	—	95	536	312·54	317·98	+21·88	—

THE EASTERN HALF OF THE SUN'S DISC IS MORE SPOTTED THAN THE WESTERN.

When, in the year 1906, Mrs. Maunder undertook the investigation into the behaviour of the groups of spots upon which her paper, mentioned above, was based, the sunspot *Ledgers* lent themselves admirably to her purpose. For, as just shown, the *Ledgers* supplied, day by day, throughout the

entire history of each group the area of the group for the day, together with its distance in solar longitude from the median line of the Sun. In 1906 the only complete solar cycle for which the *Ledgers* had then been published was that which lasted from 1889–1901, and it was, therefore, the spot groups of that cycle which were submitted to examination. The *Ledgers* now are complete from 1874 to 1915.

Dividing the Sun's surface, therefore, into strips, corresponding to the average distance passed over by a spot in a single day, it was found that on the whole, taking these strips, or lunes, one by one and comparing each lune on the east of the Sun's centre with the corresponding one on the west, the total spotted area given by the eastern lunes was always greater than that of the corresponding western lunes when the sums of the areas of all groups were taken for the entire cycle as shown in the annexed figure.

FIG. 2.—Comparison of the total Spotted Area in the Seven Lunes East of the Central Meridian of the Sun with that in the Seven Lunes on the West, during the Cycle 1889 to 1901.

But a much more striking effect was seen when simply the *numbers* of the spot groups, not their areas, were taken. When the number of groups found in corresponding lunes, east and west, were compared, the eastern lune always showed a greater number of groups than the western. Or, to put the matter a little differently, if those groups which both formed and dissipated in the visible hemisphere be neglected, and those also which both formed and dissipated in the unseen hemisphere, then in the sunspot cycle 1889–1901 no fewer than 947 groups came round the eastern limb of the Sun into view of the Earth, but

only 777 passed out of sight from the Earth at the western limb into the invisible hemisphere. During this period of 12 years, therefore, no fewer than 170 spot groups faded out in the course of their progress across the disc *more* than came into existence, so that the Earth was apparently responsible for the extinction of about 170 groups—that is to say of more than one-sixth the whole number that came into view at the east limb.

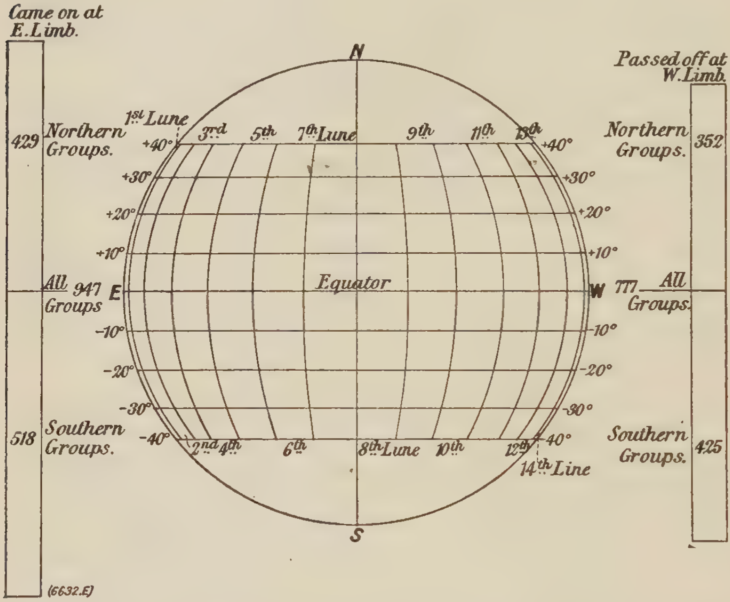


FIG. 3.—Comparison of the Numbers of Spot-Groups coming on the Disc of the Sun at the East Limb and passing off at the West Limb, during the Cycle 1889 to 1901.

This preponderance of east over west would seem, therefore, to imply a damping influence upon sunspots due to their position relatively to the Earth. If this be so it is natural that it should be *relatively* much more obvious when the numbers of sunspots are considered than when their areas are taken, since it would be the small groups that would die out the most easily.

The "prominences" or red flames seen round the circumference of the Sun seem to show a slight, yet quite distinct, want of symmetry of the same kind, the eastern prominences being more numerous than the western, except in the years of minimum, when there are very few prominences seen at all.

The Earth then has an influence, or, at least, an "apparent influence," over the Sun, since the groups of spots are, on the whole, considerably more numerous in the eastern half of the Sun's disc than they are on the western half, and a similar relation is noticed in the case of prominences and of the total spotted area. Now the median line of the Sun dividing the

eastern half of the disc from the western is distinguished from any other solar meridian only in this: that it is the median line *as seen from the Earth.* It is defined entirely by the position of the Earth, not by any solar feature. Every part of the Sun's surface passes in its turn under that meridian. If, then, spots and prominences form and dissolve, wax and wane, with some numerical relationship to the central meridian, they do so with a numerical relationship to the position of the Earth *as such.* And that implies a causative relation between the position of the Earth and this want of symmetry between the eastern and western segments of the Sun as seen from it.

Reasons for extending the Enquiry to the Faculæ.

The Earth is so very small and the Sun and its sunspots so very large that we feel obliged to look in any direction rather than to a real influence exerted by the Earth, for an explanation of this predominance of the East over the West.

Thus it is natural to suppose that some error may have crept in due to the effect of foreshortening. This foreshortening is, of course, on the whole corrected for in the ordinary processes of reduction, but it is possible that there may be some small effects unconsidered. Further, some spots may be large enough to be seen when fully presented on the disc, but be too small to be detected when greatly foreshortened near the limb, thus affecting the totals both of areas and numbers. But, from the nature of the case, all such effects should be symmetrical with respect to the central meridian, and therefore no systematic difference between the eastern and western halves of the disc should arise from them. Spot groups may and do develop unsymmetrically, but when we consider all the spots of a cycle, we cannot suppose that there would be a tendency to attain any particular phase, say their maximum, on a solar meridian that was defined solely by the position of the Earth, unless we assume that which we are reluctant to admit, namely, that the Earth has a real effect on the growth and development of sunspots.

But it is conceivable that there might be some physical characteristic of sunspots, purely solar in its nature, which would render them more easily visible when they are approaching us,—that is, when they are moving from the east limb toward the central meridian,—than when they are receding from us. Thus if we suppose that the sunspots are funnel-shaped depressions in the photosphere, of which the axes are generally sloped downwards from the west towards the east, it might explain this predominance. But this will not serve us, for we find the same predominance in prominences which are elevations as we do in spots which we have suggested may be depressions.

Again, it is conceivable that there may be a great heaping up of the surface behind the sunspot which might leave its preceding part uncovered but hide its following, thus giving a fictitious predominance to the spots east of the centre. Such a heaping up of the surface actually takes place in the faculæ and we can test

its effect by analysing the faculæ in the eastern and western semicircles of the disc. If they give, on the whole, equal values for east and west, then this might afford a plausible explanation of the inequality in spots. If the faculæ give an eastern predominance or a western predominance, then the nature of the influence has still to be found; indeed in the latter case an additional problem would be raised for solution.

A Sectional Enquiry.

The writer had recognised, shortly after the appearance of Mrs. Maunder's paper, the advisability of setting on foot a similar enquiry into the distribution of the faculæ, and some considerable progress had been made with it, when circumstances interfered with the work and it was put aside. But about two years ago some Members of the British Astronomical Association expressed their willingness to take part in any simple calculations which might prove of use, and their generous offer encouraged the Director to take up the enquiry again. The following part of the Memoir is, therefore, strictly speaking, the work of the Section. The Members of the Section who took part were :—

Bruce H. Clarke, 3 St. Aubyn's Mansions, Hove, Sussex.
R. M. Fry, 64 Craven Park, Willesden, N.W.10
Anthony Johnson, Haroldswick, Unst, Shetland.
H. W. Raisin, B.Sc., 24 Arnwood Road, West Southbourne, Hants.
H. B. G, Ronalds, The Bungalow, Almeley, Eardisley, Herefordshire.
D. R. Sharpe, Boxhill Cottage, Highclere, near Newbury.
Hubert Charles Trent, B.Sc., Camden House, Camden St., Lowestoft.

The above gentlemen carried out much the greater part of the tedious and fidgetty work of going through the volumes of the Greenwich Photo-heliographic Results and separating the faculæ observed on each day into four classes according to the quadrant in which they appeared. The boundaries of these four quadrants were determined by the four points where the equator of the Sun and the extremities of the solar axis met the circumference. When this separation had been made for each day and the total areas of the faculæ in each quadrant had been ascertained, the sums of the areas were taken for each month.

The work of assigning each group of faculæ to its proper quadrant required great care and attention, and it was necessary to go over every entry a second time independently. With regard to the distribution of the faculæ between the east and west limbs, every figure was examined, and the totals taken out, day by day, and month by month, quite independently. Mr. Johnson and Mr. Ronalds undertook also a considerable portion of this examination.

It would have been entirely beyond the power of the Director to have carried out this investigation alone; it has been strictly the work of the Section.

COMPARISON OF THE AREAS OF THE FACULÆ ON THE EAST AND WEST LIMBS FOR THE YEARS 1886–1895.

The method of dividing the Sun's disc into fourteen lunes as well as into the two hemispheres, north and south, employed by Mrs. Maunder in her paper "On the Apparent Influence of the Earth on Sunspots" could not be carried out with respect to the faculæ, since the latter cannot be followed day by day right across the disc; nor can groups seen near one limb be in all cases identified with certainty when seen near the other. Faculæ, too, are less distinguishable from the general solar surface, their outlines are not so sharp and characteristic as those of sunspots, and personality in the measurer and differences in density and definition between different photographs have greater effect on the measurement. On the other hand, the material to be dealt with was much more extensive. The results for the faculæ are now available for forty-two years; in Mrs. Maunder's inquiry on sunspots, only twelve years were employed. But in that earlier paper the entire cycle 1889–1913 was treated as a whole; in the present inquiry the distribution of the faculæ between the east and west limbs is given for each month and for each year.

The results of this enquiry for the years 1886 to 1916 inclusive were communicated to the Royal Astronomical Society last June; the present paper combines with the results then given those obtained from the years 1875 to 1885. The work of the Heliographic Department began on April 17, 1874, but the photographic record was much interrupted during the first four years, the number of days for which photographs were available being, for 1874, 141; for 1875, 263; for 1876, 271; for 1877, 235. From 1878 onward the average number of days per annum available has been 357, and from 1885 onward, 362. No use, therefore, has been made of the observations in 1874, and the three following years are of comparatively little weight. The records for 1878 and onward are thus practically continuous, but it was not until 1886 that the present scale of nearly four inches, or one decimetre, to the solar radius was adopted at all the observatories sending solar negatives to Greenwich for measurement and reduction. Prior to 1886, also, different photographic methods prevailed in some of the observatories, with the result that there were wide differences in the distinctness with which the faculæ were brought out. In consequence less weight must be attached to the years prior to 1886 than to those following, and still less to those prior to 1882, when the first photographs on the scale of a decimetre to the Sun's radius were taken.

COMPARISON EXTENDED TO THE YEARS 1875–1916.

The present paper therefore is an extension of the "Note on the Distribution of Solar Faculæ," communicated by the Director to the Royal Astronomical Society in June, 1920, and published in the *Monthly Notices* of that Society, Vol. LXXX., pp. 724–738. The six following tables are extensions of the tables in that paper which bear the corresponding numbers and headings, and render complete for the 42 years, 1875–1916, the figures there given. Table I., therefore, supplies for each

year the mean daily areas, north and south, of sunspots and faculæ, corrected for foreshortening, and expressed in millionths of the Sun's visible hemisphere. The areas, both of spots and faculæ, are given, first for spots or faculæ North of the Sun's equator; then for those South; then for the entire disc. The percentage of the total areas of the spots or faculæ that are found in the northern hemisphere follows next. The proportion per thousand of the total faculous area is exhibited in the last three columns: (1) for northern latitudes; (2) for southern; and (3) for the entire disc.

Tables II. and III. give the mean daily areas of faculæ for each month of 12 years of observation, viz., 1875 to 1885, together with 1916, and the differences between the areas on the West limb and those on the East are attached. Table II. is devoted to the northern hemisphere, Table III. to the southern.

Table IV. exhibits the mean daily areas of faculæ in all latitudes for each month of the 12 years concerned, and the totals for the 12 years are taken for each month. The figures confirm the conclusion arrived at in the earlier paper that there is no sufficient indication of an annual period.

Fig. 4 does not correspond in form with either of the two figures given in the paper communicated to the R.A.S., but brings out clearly the relation in the mean daily areas of faculæ on the East and West limbs, for each of the 42 years. The white columns represent the areas of western faculæ; the black columns those of the eastern faculæ; and the shorter column for any year is supposed to be laid upon the longer one. Thus, a black column with a white top means that the areas of the western faculæ are greater than those of the eastern, and *vice versâ.* It will be seen at a glance that in 31 years, the eastern faculæ covered the larger area; in 10 years the western faculæ prevailed; and in 1913, the two limbs were equally balanced. As mentioned above, for the 20 years 1896 to 1915 inclusive, there was not a single year in which the western limb showed an excess of area over the eastern.

As in the earlier paper, based on the examination of 35 years, so in the present, which is extended to 42, some evidence is presented that appears to suggest that the relation between the areas of the faculæ on the Eastern and Western limb varies with this progress of the solar cycle. The forty-two years included in the present paper comprise three complete cycles of the solar activity, assuming that such cycles are reckoned from the first signs of increasing activity. These three cycles comprise (*a*) the 11 years from 1879 to 1889; (*b*) the 12 years from 1890 to 1901; and (*c*) the 12 years from 1902 to 1913. Of these 35 years, 7 were years of increasing activity; during 12 the activity was at maximum, and during the remaining 16 years it was on the decline. Table V. shows that the preponderance of the faculæ on the Eastern limb was very markedly greater when the solar activity was on the decline. Combining the three cycles together, we find that there was a complete agreement for the whole period of 35 years in the relationship of the Northern faculæ to the Southern with respect to the predominance of faculæ on the East; and the inclusion of the 7 remaining years makes no appreciable difference.

TABLE I.

Mean Daily Areas, North and South, of Sunspots and Faculæ, with the Proportion of the Areas of Faculæ seen on the West Limb, for each Year from 1875 to 1916.

Year.	No. of Days.	Sunspots.				Faculæ.						
		N	S	N+S	$\frac{100\,N}{N+S}$	N	S	N+S	$\frac{100\,N}{N+S}$	$\frac{1000\,W}{W+E}$ N	S	N+S
1875	261	145	103	248	58	338	172	510	66	461	606	510
6	270	40	87	126	32	83	161	244	34	386	499	461
7	235	38	70	108	35	73	89	162	45	454	562	514
8	344	21	1	22	95	55	11	66	83	376	547	404
9	297	11	27	38	30	77	51	128	60	234	606	382
1880	340	269	171	440	61	527	405	932	56	482	495	487
1	346	455	226	681	67	1155	807	1962	59	492	523	505
2	343	442	558	1000	44	1107	1034	2141	52	512	543	527
3	340	339	815	1154	30	701	1159	1860	38	478	502	489
4	315	478	601	1079	44	897	1133	2030	44	474	483	479
5	359	280	526	806	35	492	999	1491	33	474	490	485
6	363	76	305	381	20	191	388	579	33	499	474	482
7	361	44	135	179	25	103	201	304	34	476	489	485
8	359	20	69	89	22	37	202	239	16	430	503	492
9	360	5	73	78	6	20	111	131	15	672	536	561
1890	361	53	46	99	53	143	160	303	47	530	534	532
1	363	400	169	569	70	991	424	1415	70	520	467	504
2	362	607	607	1214	50	1587	1684	3271	49	512	502	507
3	360	517	941	1458	35	938	1466	2404	39	497	489	491
4	364	543	739	1282	42	788	1089	1877	42	481	492	488
5	364	565	409	974	58	1266	1012	2278	56	522	503	514
6	364	203	340	543	47	518	893	1411	37	487	493	491
7	364	196	318	514	38	456	690	1146	40	477	482	480
8	363	110	265	375	29	296	595	891	33	483	487	486
9	364	23	88	111	21	73	264	337	22	446	448	448
1900	360	26	49	75	35	79	101	180	44	402	546	482
1	359	22	7	29	77	13	17	30	43	483	177	307
2	349	42	21	63	67	118	60	178	66	520	446	495
3	350	132	208	340	39	397	574	971	41	476	457	465
4	363	268	220	488	55	985	783	1768	56	489	483	487
5	364	750	441	1191	63	1557	1056	2613	60	479	485	485
6	364	539	239	778	69	1467	853	2320	63	478	491	483
7	365	489	593	1082	45	948	1051	1999	47	490	475	482
8	366	316	381	697	45	837	1262	2099	40	452	452	452
9	364	299	393	692	43	575	780	1355	42	454	432	442
1910	365	66	198	264	25	317	654	971	33	434	451	445
1	364	17	47	64	27	152	307	459	33	401	397	399
2	365	1	36	37	2	34	176	210	16	414	414	414
3	365	5	2	7	67	53	42	95	56	468	536	498
4	365	99	53	152	65	239	216	455	53	506	454	481
5	365	379	318	697	54	772	748	1520	51	491	488	490
6	365	468	255	723	65	1046	737	1783	59	518	512	515

NOTE.—The figures for 1916 are only provisional.

TABLE II.

Mean Daily Areas of Faculæ (NORTHERN Hemisphere), with the Mean Differences in Area between the West and East Limbs, for each Month, from 1875 to 1885, and in 1916.

Month.	Mean Daily Area.	W − E.	Mean Daily Area.	W − E.	Mean Daily Area.	W − E.	Mean Daily Area.	W − E.
	1875		1876		1877		1878	
January	596	+ 88	100	− 14	126	− 6	19	− 11
February	469	− 67	38	+ 2	136	− 56	12	− 12
March	532	+ 78	271	+ 21	45	+ 21	89	+ 17
April	490	− 108	158	− 26	88	+ 28	25	− 15
May	259	− 53	69	− 25	133	+ 29	99	− 99
June	224	+ 70	76	− 14	39	− 27	146	+ 46
July	269	− 65	54	− 38	41	+ 29	18	− 18
August	325	− 65	0	—	99	− 87	8	− 8
September	284	− 74	90	− 76	89	+ 3	114	− 12
October	311	− 41	38	− 38	23	− 23	67	− 55
November	201	− 51	78	− 6	36	+ 2	53	− 1
December	99	− 35	24	− 24	15	+ 7	5	+ 5
	1879		1880		1881		1882	
January	37	+ 9	327	− 57	754	+ 76	863	+ 277
February	35	− 19	584	+ 66	1801	− 49	1095	+ 67
March	32	− 12	532	—	1389	+ 3	993	− 125
April	12	− 6	438	− 276	1047	+ 159	1261	+ 95
May	108	− 76	603	+ 41	705	+ 69	1046	− 24
June	0	—	415	+ 89	893	− 207	749	+ 21
July	146	− 114	493	− 149	1274	− 76	1453	− 21
August	111	− 33	596	+ 198	1093	+ 103	1108	+ 2
September	88	− 88	694	− 122	1219	+ 7	1325	− 53
October	188	− 56	645	+ 53	1237	− 187	1379	+ 127
November	61	+ 11	449	− 47	1071	+ 27	1177	− 131
December	110	− 110	547	− 31	1375	− 169	830	+ 76
	1883		1884		1885		1916	
January	1073	− 29	1523	− 231	802	+ 78	954	− 70
February	999	− 11	1968	+ 58	481	− 87	972	+ 178
March	645	− 107	1031	− 277	367	+ 13	935	− 13
April	579	+ 29	662	+ 92	452	− 44	1561	− 7
May	639	− 159	668	+ 14	782	− 160	880	+ 56
June	428	− 112	380	− 72	553	− 1	778	+ 146
July	412	+ 84	739	+ 91	523	+ 75	1030	+ 52
August	464	− 4	402	+ 36	590	− 68	880	+ 62
September	423	− 123	802	− 4	297	− 61	894	+ 44
October	905	+ 3	937	− 185	487	+ 31	889	− 19
November	932	+ 42	864	− 26	273	− 33	1337	+ 37
December	911	+ 21	793	− 53	298	− 52	1444	− 2

TABLE III.

Mean Daily Areas of Faculæ (SOUTHERN Hemisphere) with the Mean Differences in Area between the West and East Limbs, for each Month, from 1875 to 1885, and in 1916.

Month.	Mean Daily Area.	W−E.	Mean Daily Area.	W−E.	Mean Daily Area.	W−E.	Mean Daily Area.	W−E.
	1875.		1876.		1877.		1878.	
January - -	445	+201	169	− 5	29	− 29	27	− 13
February - -	141	+ 43	157	− 1	0	—	31	+ 3
March - -	320	+ 64	239	+ 15	132	− 34	8	+ 8
April - - -	150	+ 40	128	+ 6	150	+ 38	0	—
May - -	105	+ 15	234	− 14	91	+ 35	4	− 4
June - - -	151	+ 25	68	− 48	112	− 12	11	+ 3
July - - -	152	+ 6	273	+ 3	50	+ 4	9	− 9
August - -	38	− 38	126	+ 86	13	− 3	4	+ 4
September - -	99	+ 69	194	+ 30	154	− 44	0	—
October - -	117	+117	199	+ 15	58	+ 22	11	+ 3
November - -	141	+103	123	− 63	191	+ 87	6	—
December - -	209	−119	26	− 26	92	+ 70	17	+ 17
	1879.		1880.		1881.		1882.	
January - -	29	− 23	378	+108	627	+187	477	− 29
February - -	28	—	335	−177	912	+104	782	+140
March - -	32	− 24	231	− 13	966	+ 58	1190	+320
April - - -	164	+108	293	+175	975	+215	1531	+317
May - - -	20	− 4	76	—	754	−178	1523	+107
June - - -	10	− 4	335	− 53	1078	−134	1034	−100
July - -	80	+ 80	864	−130	1060	− 46	1313	− 37
August - -	25	+ 25	349	+ 91	954	− 24	773	+ 81
September - -	0	—	490	+ 20	847	+187	808	− 58
October - -	51	+ 21	578	+ 92	525	+103	728	+ 40
November - -	105	− 45	445	+ 65	363	+ 67	1318	+104
December - -	72	− 4	491	−223	630	− 58	928	+186
	1883.		1884		1885.		1916.	
January - -	882	+182	1599	− 35	1102	+ 76	661	− 7
February - -	902	+100	1318	+108	1329	− 9	825	+ 11
March - -	830	− 8	1232	+ 60	1155	− 29	1204	−114
April - - -	893	− 81	1372	+ 74	861	−113	974	+118
May - - -	575	− 59	1365	−133	1122	+160	867	+ 61
June - - -	943	+147	521	− 43	1147	−149	654	+ 58
July - - -	1675	+179	906	+ 36	1435	−117	616	− 2
August - -	1226	−368	868	−254	916	− 60	531	+ 55
September - -	1070	− 14	994	−108	808	+134	574	− 38
October - -	1704	+ 78	1051	+103	964	−108	440	− 8
November - -	1556	+ 12	1254	− 44	667	+ 41	651	+125
December - -	1654	−308	1119	− 21	476	− 60	845	− 57

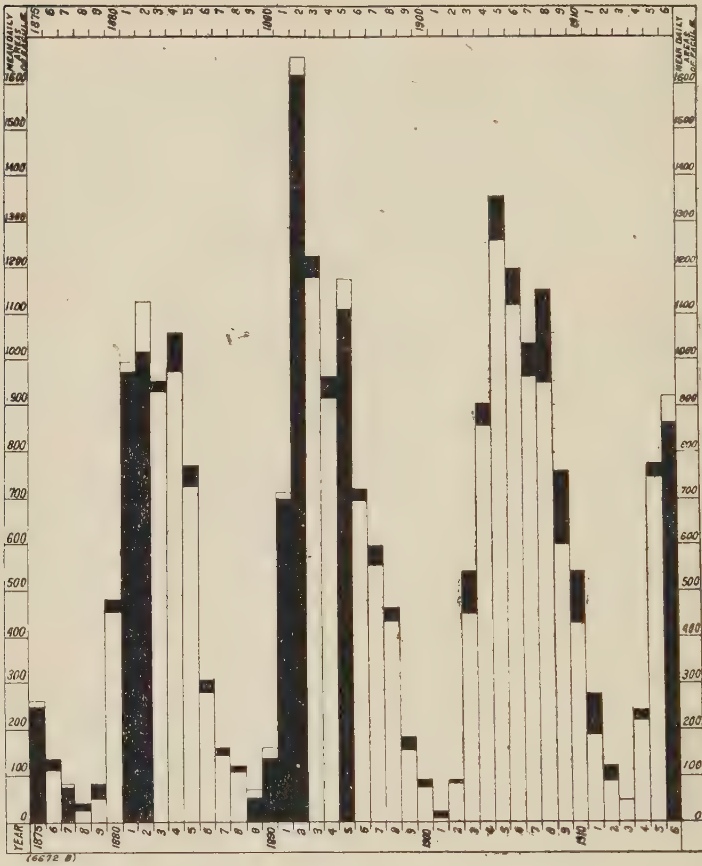


FIG. 4.—The white columns in the above diagram represent the mean daily areas of the faculæ on the West limb, the black columns those of the faculæ on the East limb; the shorter column for each year being superposed on the longer one, so that the cap of each column represents the area by which the under column, *i.e.*, the longer one, exceeds the shorter one.

This is a satisfactory and important result. A period of 35 years, equally with the longer period of 42 years, is sufficient to smooth out all accidental discordances due to differences of climate and weather, differences of exposure and development, differences in the scale of image adopted, differences due to personality of the measurers, when we compare the Northern and Southern hemispheres of the Sun. The inequality between Eastern faculæ and Western is not affected thereby. We may therefore consider that the varying inequalities between the Eastern and Western faculæ which we find in the various phases of the solar cycle of "Rise," "Maximum" and "Fall," are likewise not seriously affected by these accidental sources of discordance.

If instead of commencing a cycle, as it is most natural to do, with the beginning of the rise of activity, we take any clearly marked phase of the solar curve, and reckon the cycle as lasting until the next corresponding point is reached, then the figures now available enable eleven complete cycles to be presented as in Table VI. Of these, the second, sixth and tenth start with the commencement of the rise.

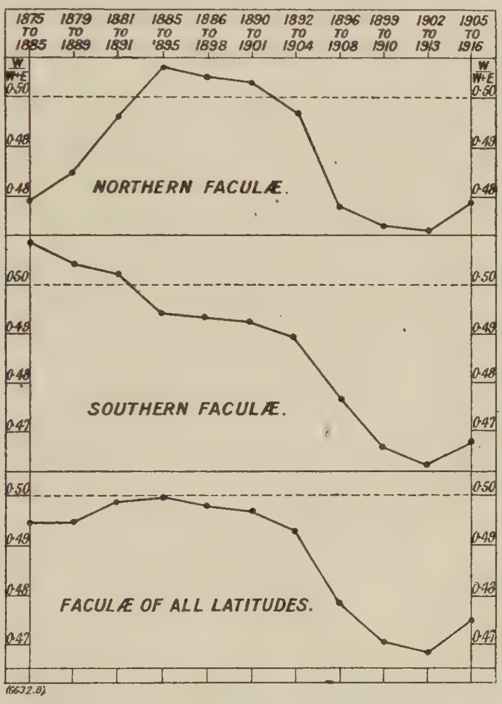


FIG. 5.—Percentage of Western Faculæ in Eleven successive Periods, each extending from one well-marked Phase of the Sunspot Cycle to the next Recurrence of the same Phase.

Fig. 5 illustrates Table VI. It will be seen that for the Northern faculæ, the Western limb is more prolific than the Eastern, during the fourth, fifth and sixth periods; the Southern faculæ show a relative decline in the areas on the West limb from the first period till the tenth, so that the Northern and Southern faculæ are in strong contrast for the seven earlier periods; during the last four they are in close agreement.

CONCLUSIONS.

The statistics brought together in this paper and summarised in the tables and diagrams, suggest two definite conclusions.

First.—The mean daily areas of the faculæ vary with the progress of the solar cycle in close conformity with the variation in the areas of the spots. This holds good not merely for faculæ and spots as a whole but also for the distribution of both between the two hemispheres, North and South.

Next.—The excess in the total measured areas of spots East of the Central Meridian of the Sun, over those to the West of it finds a parallel in the excess shown by the mean daily areas of faculæ on the East limb over those on the West limb. This excess of nearly 3 per cent. in the faculous area of the East limb over that of the Western is the average for forty-two years, and shows no change practically from that of the thirty-five years which make up the three complete cycles included. If future

TABLE IV.

Mean Daily Areas of Faculæ (ALL LATITUDES included) for each Month, from 1875 to 1885, and in 1916.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1875 -	1041	610	852	640	364	375	421	363	383	428	342	308
1876 -	269	195	510	286	303	144	327	126	284	237	201	50
1877 -	155	136	177	238	224	151	91	112	243	81	227	107
1878 -	46	43	97	25	103	157	27	12	114	78	59	22
1879 -	66	63	64	176	128	10	226	136	88	239	166	182
1880 -	705	919	763	731	679	750	1357	945	1184	1223	894	1038
1881 -	1381	2713	2355	2022	1459	1971	2334	2047	2066	1762	1434	2005
1882 -	1340	1877	2183	2792	2569	1783	2766	1881	2133	2107	2495	1758
1883 -	1955	1901	1475	1472	1214	1371	2087	1690	1493	2609	2488	2565
1884 -	3122	3286	2263	2034	2033	901	1645	1270	1796	1988	2118	1912
1885 -	1904	1810	1522	1313	1904	1700	1958	1506	1105	1451	940	774
1916 -	1615	1797	2139	2535	1747	1432	1646	1411	1468	1329	1988	2289
Mean for the above 12 years.	1133	1279	1200	1189	1061	895	1240	958	1030	1128	1113	1084
Mean of 42 years 1875 to 1916.	1085	1148	1125	1134	1126	1022	1217	1113	1137	1177	1084	1117

cycles of solar activity are comparable with these three past cycles, we should be disposed to expect that this proportion of excess from the Eastern limb would not be greatly altered with increase in the period. It may be remembered that in Mrs. Maunder's paper, dealing with the sunspots of 1889 to 1901, the excess in sunspot area of the Eastern hemisphere over the Western, is of the same order as that now found for the excess in Eastern faculæ; and as Mrs. Maunder found for Eastern prominences, 1892 to 1905, viz. 2½ per cent. Thus the "Apparent Earth Effect," of whatever nature it may be, seems to be the same, and to act in the same way, and to a similar degree, alike upon sunspots, faculæ and prominences.

But this conclusion rules out any explanation of the "Apparent Earth Effect" which ascribes it to a mere perspective effect depending on the level of the solar marking, for it applies equally to sunspots, faculæ and prominences which are at very different levels. Thus if it were suggested that spots, being depressions in the photosphere, were better seen when in the Eastern semicircle of the disc than in the Western, because in the latter case they were partly concealed by the faculæ in

their rear, this suggestion would fail because it could not account for a similar inequality in the case of the faculæ, since these made up the very ridges which partially hid the spots.

But may not the "Apparent Earth Effect" be due to something of a tidal influence—that is to say, a gravitational influence exercised on the photosphere by the Earth?

TABLE V.

Change in the Relative Areas of Faculæ, West and East, with the Progress of the Solar Cycle.

Phase.	No. of Yrs.	First Cycle.		Second Cycle.		Third Cycle.		1000 W/(W + E)		
		From	To	From	To	From	To	North	South	All Latitudes.
Rise	7	1879	1880	1890	1891	1902	1904	492	482	488
Maximum	12	1881	1884	1892	1895	1905	1908	491	493	492
Fall	16	1885	1889	1896	1901	1909	1913	466	471	469
1879–1913	35	1879	1889	1890	1901	1902	1913	487	486	487
1875–1916	42							488	487	487

TABLE VI.

Indication of Long Period in the Changes of the Relative Areas of Faculæ on the West and East Limbs.

Duration of Cycle.		No. of Yrs.	Mean Daily Area of Faculæ (W + E) for each Cycle.			$\frac{1000\ W}{W+E}$			Commencing Phase.
From	To		N	S	N + S	N	S	N + S	
1875	1885	11	500	548	1048	479	509	495	Middle point of Fall,
9	9	11	483	590	1073	485	504	495	Commencement of Rise.
1881	1891	11	530	602	1132	496	502	499	„ „ Maximum.
5	5	11	595	703	1298	506	494	500	„ „ Fall.
6	8	13	564	685	1249	504	493	498	Middle point of Fall.
1890	1901	12	595	699	1294	503	492	497	Commencement of Rise.
2	4	13	578	709	1287	497	489	493	„ „ Maximum.
6	8	13	596	630	1226	478	477	478	„ „ Fall.
9	1910	12	614	620	1234	474	467	470	Middle point of Fall.
1902	3	12	621	632	1252	473	463	468	Commencement of Rise.
5	6	12	666	658	1324	479	468	474	„ „ Maximum.

Two considerations make it clear that if gravitation enters into the case, it can only be as a minor factor. For if we turn to Table VI., where the statistics are combined so as to present eleven complete periods, each reckoning from one marked phase of the solar curve to the next similar phase, so as to get rid of any minor inequalities due to special phases of the curve, we find that there is a distinct progression with the time, and that this progression differs strikingly in the Northern and the Southern hemispheres. Thus in the Northern hemisphere, we have an Eastern excess in the first of the eleven periods gradually diminishing until it has been converted into a Western excess by the fourth period. After this the Western excess diminishes in its turn until the tenth period. In the Southern

hemisphere, on the contrary, the first period shows a distinct Western excess which diminishes steadily to the tenth period. Fig. 5 exhibits this in graphical form. The curves for the Northern and Southern hemispheres of the Sun are quite different for the first seven periods.

Now it is evident that the Earth's gravitational influence upon the Sun must be the same for its Southern as for its Northern hemisphere; and that it also must remain practically the same throughout the whole of the solar cycle and from one solar cycle to another.

The influence of the Earth, whether real or only apparent, seems then to be of such a kind that it does not necessarily have the same effect at any one time upon both the Northern and Southern hemispheres of the Sun. It seems also to be of such a kind that its effect changes with the course of the solar cycle and in a period or periods longer still.

It is evident that these enquiries cannot be left at this stage. The investigations into the differences between East and West both in sunspots and in faculæ must be pushed further, not only in their detail, but in the periods of time covered. For instance, the unexpected difference between the curves for the Northern and Southern faculæ as shown in Fig. 5, suggests that there is still something that requires to be followed up further; there is still "something lost behind the ranges."

Now, as has been already pointed out, the method used in the present paper, and the length of time over which the observations extend, differ from the method and the length of time covered by the observations discussed by Mrs. Maunder in 1907 in her paper dealing with sunspots.

It will be necessary, therefore, to approximate the treatment of the faculæ to Mrs. Maunder's treatment of the spots, and to extend her discussion of the twelve years 1889 to 1901, to the whole forty-two years 1875 to 1916; and we may hope ere long to extend the whole enquiry to the date of the approaching minimum.

I would, therefore, suggest the following lines of statistical enquiry:—

1. To treat *the number of groups* of faculæ, instead of the areas.

2. In dealing with the areas of faculæ, to divide them into three classes, for separate discussion, viz., faculæ of high latitude (over 45°); faculæ unassociated with spots; faculæ associated with spots,—in all cases treating Northern and Southern faculæ separately.

3. To distribute the faculæ into zones of 5° breadth in latitude, or, more conveniently, into zones of 10°.

4. To complete the enquiry of Mrs. Maunder's paper by extending it to the years 1875 to 1888, and 1902 to 1916.

5. To treat sunspots year by year, as the faculæ have been treated in the present paper.

May I ask for yet further help?

E. WALTER MAUNDER, *Director of the Section.*

9. Carrington's Method of Observing Sun-spots.

By E. WALTER MAUNDER, F.R.A.S.

The method employed by the late R. C. Carrington* for determining the heliographic positions of sunspots is simple and effective. No micrometer is required, or other expensive addition to the telescope; nothing but a white screen upon which two straight lines have been carefully drawn, so as to intersect each other, exactly at right angles. The mode of obtaining the image is by projection, the eyepiece of the telescope being drawn out a very little and the screen moved towards the eyepiece or away from it until a sharp image of the desired diameter is obtained. Two conditions must be fulfilled: the optical axis of the telescope should be perpendicular to the plane of the screen, and should meet it at the point of intersection of the cross-lines. The distinctness of the image will be greatly improved if a large sheet of cardboard is fitted, like a collar, round the telescope tube so as to shade the screen from any rays of the Sun except those passing through the telescope; the image of the Sun formed by projection in this manner gives no trouble from excess of brightness, *and is free from danger to the eyesight of the observer—an important consideration, especially to beginners, who are apt to underestimate the intensity of sunlight.*

The telescope thus prepared is pointed a little to the west of the Sun's place in the sky and firmly clamped. The rotation of the earth will bring the image of the Sun into the field, and it will pass over the cross-lines on the screen. It will save trouble if the screen has been turned so that the line of direction in which the Sun appears to move will meet each of the cross-lines at the same angle; *i.e.* at 45°. But a small divergence from this angle is not important, as the observations themselves supply the means for determining its amount.

As the Sun passes over the cross-lines the time is noted—to the tenth of a second, if possible—when the circumference of the Sun first meets one of the cross-lines, and similarly when it meets the other cross-line. The times are taken again when the circumference last meets the two lines. The times are also taken, for each spot selected for observation, when its centre crosses first one line, and then the other. Six times are, therefore, recorded during each complete transit of the Sun and of a single spot. These six times serve as a complete set of measures for determining the position on the Sun of the spot selected. But it will often be possible to secure observations of several spots during the same transit, and it will always be an advantage to repeat the

* *Observations of Spots on the Sun, from November* 9, 1853, *to March* 24, 1861, *made at Redhill*, by Richard Christopher Carrington, F.R.S.

transit several—say three or five—times, as a precaution against accidental mistakes in recording the times. Such a set of transits was taken on 1919 July 9, two spots being observed; the cross-lines in the direction N.E.-S.W. being hereinafter called line A and that in the direction S.E.-N.W., line B.

TABLE I.

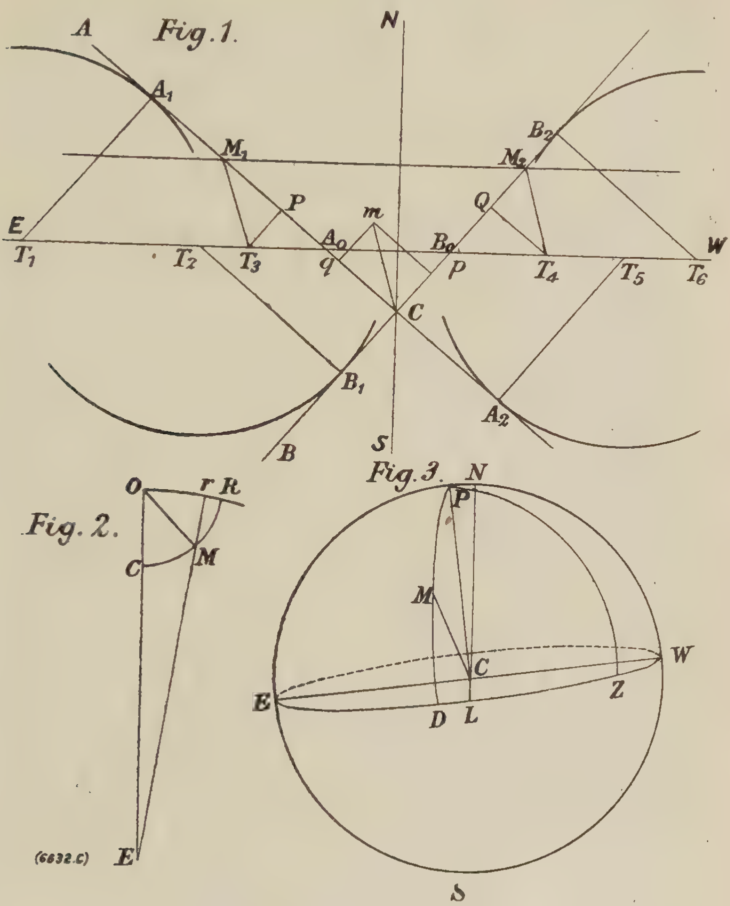
TRANSITS OF THE SUN, 1919 JULY 9.

Object.	Transit over Line	First Transit.	Second Transit.	Third Transit.	Mean.	Spot — Sun.	
		h m s 8 17 0 +	h m s 8 20 50 +	h m s 8 24 40 +	h m s 8 20 50 +	Over A	Over B
		m s	m s	m s	s	s	s
First Limb	A	0 1·4	0 8·1	0 9·4	6·3		
" "	B	0 10·6	0 16·9	0 18·1	15·2		
Regular Spot	A	1 10·5	1 17·5	1 18·5	75·5	—32·8	
" "	B	1 26·4	1 32·3	1 33·6	90·8		—17·3
Small Spot	A	1 34·9	1 41·7	1 43·7	100·1	— 8·2	
" "	B	1 53·6	1 59·8	2 0·8	118·1		+10·0
Second Limb	B	3 16·6	3 22·4	3 23·9	201·0		
" "	A	3 25·3	3 31·9	3 33·5	210·2		
Sun's Centre	A	1 43·4	1 50·0	1 51·4	108·3		
" "	B	1 43·6	1 49·6	1 51·0	108·1		
Second Limb—First Limb.	A	3 23·9	3 23·8	3 24·1	203·9		
Second Limb—First Limb.	B	3 6·0	3 5·5	3 5·8	185·8		

The time of the transit of the Sun's centre over either of the cross-lines is of course found by taking the mean of the times of transit of the two limbs, and the last column, Spot—Sun, is obtained by subtracting the time of transit of the Sun's centre from that of the spot.

The observations of the Sun made at Greenwich are taken by means of photography, and the screen, therefore, is usually the photographic plate. When a transit of the Sun is observed, a piece of ground glass is substituted for the plate, and the observer faces the Sun. The cross-lines on the ground-glass screen are the images of two fine spider's threads in the primary focus of the telescope as formed by an enlarging lens. The observer, therefore, watching a transit, is facing the Sun, the image of which, like the Sun in the sky, has its western edge to his right hand and its eastern to his left, the western edge being of course the one that first makes contact with the cross-lines. On the other hand the observer with an ordinary telescope and viewing the image of the Sun as projected on a sheet of card-board or other opaque material, has to look down on the screen, and stands with his back towards the Sun, the image entering on his right hand and moving forward towards his left. The

accompanying diagram (Fig. 1) has been drawn with the same orientation as the Sun actually has, as we see it in the sky,



To illustrate Carrington's Method.

and as it is seen on the ground glass of the Greenwich photoheliograph during the observation of a transit.

In Fig. 1, A and B are the cross-lines, A lying in the direction N.E.–S.W., B in the direction S.E.–N.W.; the two lines intersecting in C. E.W. is the path of the Sun's centre, moving from left to right and intersecting A and B in A_0 and B_0. T_1 is the position of the Sun's centre when the limb makes first contact with the line A at A_1; T_2, the position of the centre when the limb makes first contact with the line B at B_1. Similarly T_5 and T_6 are the positions of the Sun's centre when the limb makes second contact with lines A and B at A_2 and B_2.

The apparent movement of the image of the Sun across the screen is caused by the rotation of the earth, which is, therefore, our micrometer. The micrometer is read by means of our clock,

which indicates the interval of time* taken by the centre of the Sun to move a given distance along the line E.W. Thus, since the Sun's centre is at T_1 when its limb makes first contact with line A at A_1, and at T_5 when the limb makes second contact with the same line at A_2, the interval of time between the two observations is a measure of the distance $T_1 T_5$ traversed by the centre of the Sun's disc. Similarly the distance T_2T_6 is measured by the interval of time between the contacts at B_1 and B_2. Again, the mean of the two times of contact of the limb of the Sun with line A gives the time when the centre of the Sun crosses that line at A_0; similarly the mean of the two contacts with line B gives the time when the centre crosses at B_0.

In Fig. 1 the spot M intersects line A at M_1 and line B at M_2 and T_3, T_4 indicate the corresponding positions of the Sun's centre. Thus T_1, T_2, ... T_6 mark the successive positions of the Sun's centre at the six successive times of contact. These six times supply all the necessary information from which the position of the spot upon the Sun's disc can be derived.

To complete the figure, join the four points where the Sun's limb meets A and B with the four corresponding positions of the Sun's centre (A_1 with T_1, etc.). These four radii make with the lines A and B and with EW four right-angled triangles, all similar to each other. The two triangles in which A_1 and A_2 mark the right-angles are equal to each other in all respects, and may for brevity be called A_1 and A_2. Similarly the triangles B_1 and B_2 are equal to each other in all respects. Let R be the radius of the Sun and r the distance of the spot from the Sun's centre.

Draw CN due north, that is perpendicular to EW. From T_3 draw T_3P perpendicular to A, and from T_4, T_4Q perpendicular to B. From C draw Cm parallel and equal to M_1T_3 and M_2T_4, and from m, draw mq and mp perpendicular to A and B respectively: the four triangles thus formed are equal in all respects. Call the angle NCA_1, α, and the angle A_1Cm, ϕ. The position-angle of the spot from the north point, which we may call θ, will be equal to the algebraic sum of the two angles ϕ and α.

In the triangle A_1 $\quad R = T_1A_0 \cos \alpha = \frac{1}{2}T_1T_5 \cos \alpha$.

" " B_1 $\quad R = T_2B_0 \sin \alpha = \frac{1}{2}T_2T_6 \sin \alpha$.

$$\text{Therefore } \cot \alpha = T_2T_6/T_1T_5\text{; or } \tan \alpha = T_1T_5/T_2T_6 \quad (1)$$

That is, the interval taken by the Sun to cross line B divided by the interval to cross line A, gives the tangent of the angle between the line EW of the Sun's motion and the N.E. cross-line.

The triangles M_1PT_3 and M_2T_4Q are equal in all respects and the angle ϕ is T_3M_1P or M_2T_4Q; and $r = T_3M_1$ or T_4M_2.

But the interval "Spot — Sun" over line A is A_0T_3 and the interval "Spot — Sun" over line B is B_0T_4. But

$$A_0T_3 \cos \alpha = PT_3 = M_1T_3 \sin \phi = r \sin \phi$$
$$B_0T_4 \sin \alpha = QT_4 = M_2T_4 \cos \phi = r \cos \phi$$

$$\text{Dividing, } A_0T_3/B_0T_4 = \tan \phi \tan \alpha. \qquad (2)$$

* As it is only the *intervals* of time that are used in the computations the error of the clock is of little importance provided its *rate* be steady.

That is to say, "Spot — Sun" over A, divided by "Spot — Sun" over B is equal to the product of the tangents of the angles α and ϕ.

In the transits of the Sun taken on 1919 July 9, the mean time taken by the Sun's disc to pass over line A = $203^s \cdot 9$, and over B = $185^s \cdot 8$. Tan $\alpha = 203 \cdot 9/185 \cdot 8 = 1 \cdot 097$ and $\alpha = 47^\circ \cdot 7$: a constant for this set of transits.

The interval "Spot—Sun" was found for the two spots as under :—

"Regular spot."	Over A $- 32^s \cdot 8$	Over B $- 17^s \cdot 3$
"Small spot."	,, $- 8 \cdot 2$	,, $+ 10 \cdot 0$

from whence the angle ϕ is found as follows :—

	"Regular Spot."	"Small Spot."
Log "Spot—Sun" over A	$-1 \cdot 5159$	$-0 \cdot 9138$
,, ,, ,, B	$-1 \cdot 2381$	$+1 \cdot 0000$
Difference	$+0 \cdot 2778$	$-9 \cdot 9138$
Log tan α	$0 \cdot 0404$	$0 \cdot 0404$
Diff. = Log tan ϕ	$0 \cdot 2374$	$-9 \cdot 8734$
ϕ	$239^\circ \cdot 9$	$-36^\circ \cdot 8$
α	$47 \cdot 7$	$47 \cdot 7$
Sum = θ	$287 \cdot 6$	$10 \cdot 9$

θ is the position-angle of the spot, m, from the N. point of the Sun, read in the direction N., E., S., W.

The quadrant in which ϕ, the position-angle of the spot reckoned from the N.E. arm of the cross-lines, is to be found is indicated by the sign of "Spot—Sun"; the transit over A giving the sign of sin ϕ, over B, that of cos ϕ. The "regular spot" is thus in the third quadrant, the "small spot" in the fourth.

$$PT_3 : A_0T_3 :: A_1T_1 : A_0T_1.$$

But $PT_3 = r \sin \phi$ and $A_1T_1 = R$,

$$\therefore r/R = \operatorname{cosec} \phi \times A_0T_3/A_0T_1.$$

Similarly $r/R = \sec \phi \times B_0T_4/B_0T_6$.

	"Regular Spot."	"Small Spot."
Log cosec ϕ	$0 \cdot 0629$	$0 \cdot 2226$
Log A_0T_3	$1 \cdot 5159$	$0 \cdot 9138$
Sum	$1 \cdot 5788$	$1 \cdot 1364$
Log A_0T_1	$2 \cdot 0086$	$2 \cdot 0086$
Difference	$9 \cdot 5702$	$9 \cdot 1278$
r/R	$0 \cdot 372$	$0 \cdot 134$

But r/R, which gives the relation between the distance of the spot from the centre of the apparent disc of the Sun and the radius of that disc, requires a small correction in order to

give ρ, the true angular distance of the spot from the centre as measured on a great circle of the Sun itself. This is shown in Fig. 2, where EOM = ρ and OEM = ρ'. The figure shows that r/R =

$$Or/OR = Or/OM = \sin OMr = \sin (EOM + OEM) = \sin (\rho + \rho').$$

The true value of ρ corresponding to any given value of r/R may be derived from the following table:—

TABLE OF CORRESPONDING VALUES OF $\frac{r}{R}$ AND ρ.

$\frac{r}{R}$.	ρ.	$\frac{r}{R}$.	ρ.	$\frac{r}{R}$.	ρ.	$\frac{r}{R}$.	ρ.	$\frac{r}{R}$.	ρ.	$\frac{r}{R}$.	ρ.
0·010	0°·6	0·210	12°·1	0·410	24°·1	0·610	37°·4	0·810	53°·9	0·955	72°·5
·020	1·1	·220	·6	·420	·7	·620	38·1	·820	54·9	·960	73·5
·030	·7	·230	13·2	·430	25·3	·630	·9	·830	55·9	·965	74·5
·040	2·3	·240	·8	·440	26·0	·640	39·6	·840	56·9	·970	75·7
·050	·8	·250	14·4	·450	·6	·650	40·4	·850	58·0	·975	76·9
·060	3·4	·260	15·0	·460	27·3	·660	41·1	·860	59·1	·980	78·3
·070	4·0	·270	·6	·470	·9	·670	·9	·870	60·2	·982	·9
·080	·6	·280	16·2	·480	28·6	·680	42·7	·880	61·4	·984	79·5
·090	5·1	·290	·8	·490	29·2	·690	43·5	·890	62·6	·986	80·1
·100	·7	·300	17·4	·500	·9	·700	44·3	·900	63·9	·988	·9
·110	6·3	·310	18·0	·510	30·5	·710	45·1	·905	64·6	·990	81·6
·120	·9	·320	·6	·520	31·2	·720	·9	·910	65·3	·991	82·0
·130	7·4	·330	19·2	·530	·9	·730	46·7	·915	66·0	·992	·5
·140	8·0	·340	·8	·540	32·5	·740	47·5	·920	·7	·993	82·9
·150	·6	·350	20·4	·550	33·2	·750	48·4	·925	67·4	·944	83·5
·160	9·2	·360	21·0	·560	·9	·760	49·3	·930	68·2	·995	84·1
·170	·7	·370	·6	·570	34·6	·770	50·2	·935	69·0	·996	·6
·180	10·3	·380	22·2	·580	35·3	·780	51·1	·940	·8	·997	85·3
·190	·9	·390	·9	·590	36·0	·790	52·0	·945	70·7	·998	86·1
·200	11·5	·400	23·5	·600	·7	·800	·9	·950	71·6	·999	87·2

It is a question for the observer himself to decide whether he will use five-figure logarithms and work to minutes of arc, or four-figure logarithms and work to tenths of a degree. The former method was adopted by Carrington, and has an appearance of greater precision, but it does not appear that the transit-method of determining the positions of the spots is sufficiently accurate to justify it. If a great mass of observations has to be reduced the saving of labour, secured by using four-figure logarithms instead of five, becomes a consideration; in the case of a few occasional observations there is no great reason why five-figure logarithms and minutes of arc should not be employed.

In this case, ρ', the required correction to r/R, can be easily found thus :—

	Regular Spot.	Small Spot.
$\text{Log } r/R = \text{Log sin } (\rho + \rho') =$	9·5702	9·1278
$r/R =$	0·372	0·134
Angle $(\rho + \rho') =$	21° 49′	7° 43′
$16' \times r/R = \rho' =$	6	2
$\rho =$	21 43	7 41

the mean radius of the Sun being 16′ of arc.

Having determined the position-angle, θ, of the spot, M, from the N. point of the Sun's disc, read in the direction N,E,S,W, and the angular distance ρ of the spot from the apparent centre of the Sun, the next step is the conversion of these two elements into heliographic longitude and latitude.

In the *Nautical Almanac*, and the *Journal* of this Association, a little table is given every year which supplies for Greenwich mean noon of every fifth day the three following elements of the Sun :—

P, the Position-angle of the north end of the Sun's Axis from the North Point of the Sun ; and D and L, the Heliographic Latitude and Longitude of the centre of the Sun's Disc. For the mean time of the transits on 1919 July 9 the values of these three constants were :—$P = + 0°{\cdot}7$; $D = + 3°{\cdot}8$; $L = 274°{\cdot}8$. P is subtracted from θ to give χ, the position-angle of the spot from the Sun's Axis.

In Fig. 3, let N,E,S,W represent the apparent disc of the Sun ; ZLD, the equator ; C, the centre of the disc ; P, the Sun's pole, and M, the spot ; Z represents the point where the adopted zero meridian of the Sun meets the Solar equator. Then P = NCP ; D = CL ; and L = 360° − ZPL. The position angle of the spot, M, from the Sun's pole is $\theta - P = \chi$.

In the spherical triangle PCM

$$\cos PM = \cos PC \cos CM + \sin PC \sin CM \cos PCM ;$$

but $PM = 90 - \lambda$, where λ is the heliographic latitude of the spot; $PC = 90° - D$; and the angle PCM is χ ; or

$$\sin \lambda = \sin D \cos \rho + \cos D \sin \rho \cos \chi ;$$

from which λ, the latitude of the spot, is found. The heliographic longitude of the spot, reckoned from the central meridian is $(L - l)$, where L is the longitude of the centre of the Sun and l the longitude of the spot from Z, the assumed zero meridian.

A very small correction is required to be added algebraically to the angle NCA, in Fig. 1, because the line EW of the Sun's path is not exactly at right angles to CN, the meridian, except at the solstices. At the date of observation, this correction amounted to 0°·02, the Sun's path pointing slightly southward as com-

pared with a parallel of declination. Owing to its smallness the correction has been neglected in the present example.

Sun Moving Northward		Inclination of Sun's Path = ι	Sun Moving Southward	
On March 21.		0°·063	On September 22.	
On Feb. 25 -	On April 10 -	0°·060	On Sept. 8 -	On Oct. 13.
„ „ 5 -	„ May 2 -	·050	„ Aug. 13 -	„ Nov. 7
„ Jan. 24 -	„ „ 16 -	·040	„ July 30 -	„ „ 19.
„ „ 14 -	„ „ 27 -	·030	„ „ 19 -	„ „ 29.
„ „ 6 -	„ June 5 -	·020	„ „ 9 -	„ Dec. 7.
„ Dec. 30 -	„ „ 14 -	·010	„ June 30 -	„ „ 15.
„ „ 21 -	„ „ 22 -	·000	„ „ 22 -	„ „ 22.

Computation of Heliographic Positions of Two Spots seen on 1919 July 9.

Object	"Regular Spot."		"Small Spot."	
Method.	Transit.	Photograph.	Transit.	Photograph.
G.M.T.	$8^h 22^m$.	$9^h 45^m$.	$8^h 22^m$.	$9^h 45^m$.
r/R	0·372	0·385	0·134	0·133
θ	287°·6	287°·3	10°·9	5°·5
Subtract P	+0·7	+0·7	+0·7	+0·7
χ	286°·9	286°·6	10°·2	4°·8
Log cos χ	+9·4634	+9·4559	+9·9931	+9·9985
Log cos D (+3·8)	9·9990	9·9990	9·9990	9·9990
Log sin ρ	9·5687	9·5836	9·1251	9·1218
Sum = Log I.	+9·0311	+9·0385	+9·1172	+9·1193
Log sin D (+3·8)	+8·8213	+8·8213	+8·8213	+8·8213
Log cos ρ	9·9680	9·9655	9·9961	9·9962
Sum = Log II.	+8·7893	+8·7868	+8·8174	+8·8175
I	+0·107	+0·109	+0·131	+0·132
II	+0·062	+0·061	+0·066	+0·066
I + II = sin λ	+0·169	+0·170	+0·197	+0·198
λ = Hel. Lat.	+9°·7	+9°·8	+11°·4	+11°·4
Log sin χ	−9·9808	−9·9815	+9·2482	+8·9226
Log sin ρ	9·5687	9·5836	9·1251	9·1218
Log sec λ	0·0063	0·0064	0·0087	0·0087
Sum = sin (L — l)	−9·5558	−9·5715	+8·3820	+8·0531
L — l	−21°·1	−21°·9	+1°·4	+0°·7
L	274·8	274·1	274·8	274·1
l = Hel. Long.	295°·9	296°·0	273°·4	273°·4

For the purpose of comparison with the transits recorded above, the same two spots as shown on a photograph taken at Greenwich a little later on the same day were measured in the micrometer of the Royal Observatory, and the reduction of the measures is shown above side by side with the reduction of the transits. The transit method is, therefore, capable of yielding results comparable in accuracy with the photographic, provided the instrument is stable, the observer practised, and a sufficient number of transits secured to eliminate accidental errors in noting the times of contact.

When there were a large number of spots to be observed Carrington simplified the work of taking the transits by observing the contacts with line A in one transit, and with line B in the next, and so on alternately. *See* page 13 of *Carrington's Observations made at Redhill.*

On page 14 of the same work, column A, line P, *for* $56^m\ 20^s{\cdot}667$, *read* $56^m\ 50^s{\cdot}667$.

On page 15, in the Table of calculations—

Left-hand column, *for* Log cos α, *read* Log cosec α.
Right-hand column, *for* Log cosec λ, *read* Log sec λ.

On page 12, and in Plate II., fig. 5, N is used indifferently to denote the North Point and the ascending Node. Also in several places the letter S is used indifferently to denote the South Point or the Spot.

APPENDIX I.

The Stonyhurst Discs for Measuring the Positions of Sunspots.

By the Rev. A. L. CORTIE, S.J., F.R.A.S.

[A description of a simpler method than that of Carrington, for determining the heliographic positions of sunspots and faculæ, is here reprinted from Vol. XVIII., No. 1, of the *Journal* of the Association by the kind permission of the author.]

The Discs.—The originals of the discs which were made for use at the Stonyhurst Observatory were drawn to a scale of $10\frac{1}{2}$ inches to the solar diameter. Their accuracy has been verified by the method set forth in a paper in the "Monthly Notices" of the Royal Astronomical Society, Vol. 57, pp. 141–147, January 1897, From a comparison instituted between 77 positions of sunspots obtained by the use of the discs, and the extremely accurate measurements of the same spots made on the Greenwich photographs with the measuring machine, it was found that the greatest difference in longitude was $0^\circ\cdot 6$ in three cases, while 63 positions differed only between $0^\circ\cdot 3$ and 0°. Of 73 comparisons in latitude five differed $0^\circ\cdot 7$, while 55 positions were within the limit $0^\circ\cdot 3$. These discs, eight in number, are true orthographic projections of the parallels of latitude and meridians of longitude, corresponding to the eight values 0° to $\pm 7^\circ$ of the heliographic latitude of the centre of the Sun's apparent disc. The limitations of absolute accuracy in obtaining Sunspot positions by means of orthographic projections are set forth in the paper already cited.

The discs have been carefully copied from the originals on a reduced scale of 6 inches to the Sun's diameter by Messrs. Casella and Co., 11, Rochester Row, Victoria Street, London, S.W. They are reproduced on cardboard or on glazed linen, so that they can be used either on a sketching-board at the end of the telescope for direct projection of the Sun's image, or in the case of the set on glazed linen, for placing over a disc drawing of Sunspots and faculæ. The use of the discs for measuring positions is explained in the following paragraphs. In addition to the set of discs there is required the table for P, D, L : P the position angle of the N. end of the Sun's axis from the N. point of the Sun ; D the heliographic latitude of the centre of the Sun's disc or the apparent pole tilt of the Sun's axis ; and L the heliographic longitude of the centre of the Sun's disc. This table is published each year in the *Journal*.

Method of Drawing and Orientation.—The use of the discs presupposes that the Sun is observed by projection. An efficient method of procedure is as follows. A drawing-board is supported in a light frame, which can be attached by means of a collar-piece to the draw-tube of the telescope containing the eyepiece, which it should fit tightly, but not so tightly but that

it can be rotated round the draw-tube. A lining of felt is very suitable for this purpose. A convenient form of projection apparatus is shown in the accompanying diagram. The cross-bar containing the collar is made in two pieces; into the lower one are fitted the rods that carry the frame supporting the drawing-board, the upper portion being fastened over the lower half by strong hooks and eyes. The apparatus is easily attachable to and detachable from the telescope draw-tube. On a sheet of drawing paper a circle is described of the diameter, 6 inches, required to contain the projected solar image, and a horizontal diameter is drawn across the circle. Selecting a spot on the Sun's image, preferably a small one, if such be visible, the whole frame containing the drawing-board is turned about the draw-tube until the spot runs along the horizontal diameter. This fixes the direction of the earth's equator and the N. and S. points. Looking at the projected image, the W. or preceding

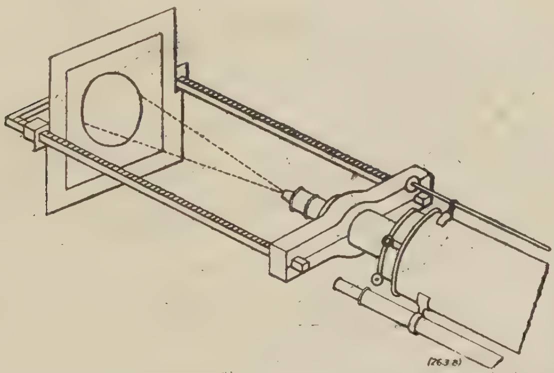


FIG. 1. Apparatus for Observing the Sun by Projection.

limb of the sun is on the left hand, the E. or following limb on the right hand, and the N. point, in any position at all of the image, is 90° counterclockwise from the E. point. This simple rule is efficient in fixing the cardinal points when an altazimuth telescope is used. The Sun's image is now made to fill the circle by means of the slow-motion gear, and the outlines of the spots and faculæ are quickly traced with a pencil, a red pencil being preferably used for the faculæ. Note the year, month, day, and G. Civil T. when the outlines of the spots were drawn. Details can now be filled into the outlines at leisure. The positions so obtained are correctly oriented with regard to the Sun's apparent N. point. The discs may now be employed with the drawings to obtain the true heliographic coordinates of the spots and faculæ. If the cardboard discs are used they can themselves be placed on the sketching-board to receive the Sun's image. Select the disc with the value for D which gives the whole degree obtained from the table in the "Memoranda for Observers," in the *Journal*, draw a horizontal diameter upon it, and to obtain the Sun's apparent N. point proceed according to the preceding instructions. Now look out the value P from the tables and turn the whole frame accordingly.

This operation is facilitated by the fact that the discs have upon them graduated arcs for every degree to 30° N. and S. on each limb. For example, let P = + 14°·30 on the day of observation. Turn the frame and board in a clockwise direction until the horizontal diameter is + 14°·30 below the zero division on the W. limb, and correspondingly above it on the E. limb. For negative values of P the frame must be turned counterclockwise. If the linen discs are used, they are laid over the completed drawing and turned to the proper value of P required as exemplified in the annexed figure.

Readings of the Positions.—Read off from the disc the apparent angular positions above or below the Sun's equator, and left

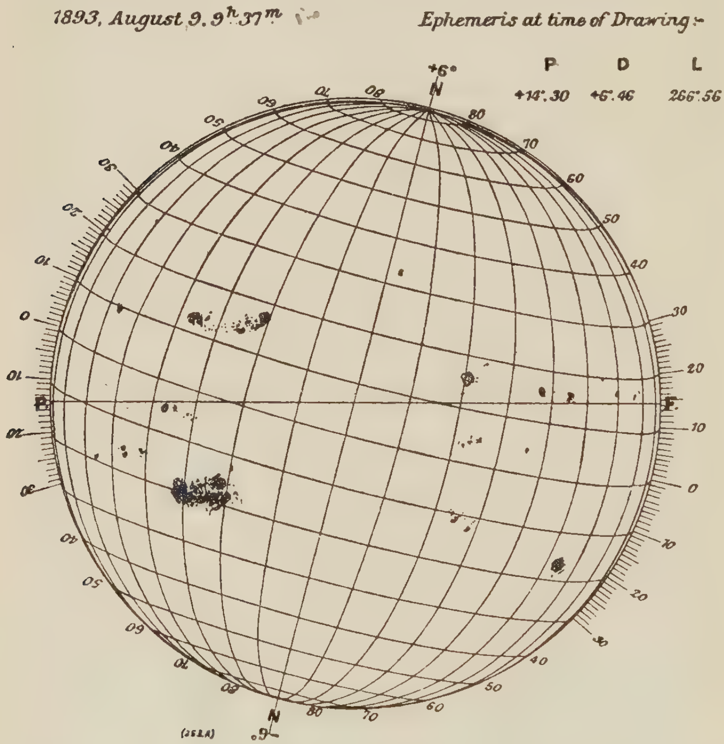


FIG. 2. Illustrating the use of a "Stonyhurst Disc."

(preceding) or right (following) of the central meridian which contains one at least of the Sun's poles. In estimating degrees near the limb allowance must be made for foreshortening on the projected image of the solar hemisphere. The values of L, the longitude, always increase from E. to W., hence angular distances measured eastwards or to the right of the central meridian are $-^{ve}$, those to west or left are $+^{ve}$. In the accompanying figure, for instance, selecting the spot in the *s.f.* quadrant the disc readings are $-16°\cdot 8$ south of equator and $-53°\cdot 5$ east of central meridian.

Latitude.—The estimated angular distance N. or S. of the equator needs correction in the following manner. The true D for the day of observation is expressed in degrees and minutes of arc or decimals of a degree, *e g*., on the date of the illustrating figure $D = +6^\circ\cdot46$. But the discs are constructed only for degree values of D. It is evident that for the spot on the central meridian a correction of $0^\circ\cdot46$, or nearly half a degree, the difference between true D and disc D would have to be applied to its disc reading to give its true latitude, while at the limbs the correction would vanish. For intermediate positions the difference between true D and disc D must be multiplied by the natural cosine of the angular distance of the spot E. or W. of the central meridian. In the case illustrated the angular distance is $53'\cdot5$. The natural cosine is $\cdot59$. The correction is $\cdot46 \times \cdot59$ or approximately $0^\circ\cdot3$, and hence the true latitude is $-16^\circ\cdot5$ South. A little consideration will show that when disc D is numerically less than true D, then for D $+^{ve}$ the correction to spot positions as read is $+^{ve}$, for D $-^{ve}$ the correction is $-^{ve}$, spots N. of the equator being $+^{ve}$ and south of the equator $-^{ve}$. The opposite holds when disc D is numerically greater than true D. For instance in the present example the disc D $+ 7^\circ$ might equally well have been employed.

The rule is—

$$\text{True D} > \text{disc D} \begin{cases} \text{D } +^{ve} \text{ correction } +^{ve}. \\ \text{D } -^{ve} \text{ correction } -^{ve}. \end{cases}$$

$$\text{True D} < \text{disc D} \begin{cases} \text{D } +^{ve} \text{ correction } -^{ve}. \\ \text{D } -^{ve} \text{ correction } +^{ve}. \end{cases}$$

regard being had to the signs of the spot-positions N. $+^{ve}$, S. $-^{ve}$.

Longitude.—First find the longitude of the central meridian for the day and time of observation. In the Table L is given for Greenwich mean noon at intervals of five days. Interpolate for interim dates. L must next be corrected for the time of observation; if the observation be taken before mean noon the correction is $+^{ve}$, if after mean noon $-^{ve}$. Although the difference in longitude of the central meridian for an interval of 24 hours varies with the time of year, it is sufficiently accurate to take $13^\circ\cdot2$ as the mean difference in longitude for 24 hours. The following short table will facilitate the computation :—

h	°	m	°	m	°
1	= 0·55.	11	= 0·10.	1	= 0·0091.
2	= 1·10.	22	= 0·20.	2	= 0·0182.
3	= 1·65.	33	= 0·30.	3	= 0·0273.
4	= 2·20.	44	= 0·40.	4	= 0·0364.
5	= 2·75.	55	= 0·50.	5	= 0·0455.
6	= 3·30.			6	= 0·0545.
7	= 3·85.				
8	= 4·40.				

All that remains after correcting L is to add or subtract the angular value of the spot's position as read on the disc W. or E. of the central meridian.

EXAMPLE (1).

Date of Drawing.—1893 August 9, $9^h\ 37^m$ G. Civil T.

Spot.—s.f. Type IV_b.

Thus "Companion to the Observatory":—

$$D = +\ 6°{\cdot}46. \quad P = +\ 14°{\cdot}30.$$
$$\text{L for Greenwich mean noon} = 265°{\cdot}25.$$
$$+ \text{ Correction for time of drawing } 2^h = 1°{\cdot}10.$$
$$20^m = 0°{\cdot}183.$$
$$3^m = 0°{\cdot}028.$$
$$\text{L, } 9^h\ 37^m \text{ G. Civil T.} = \underline{266°{\cdot}56.}$$

Disc Values.—Disc $+\ 6°$.

Latitude S. $-\ 16°{\cdot}8$. Longitude E. $-\ 53°{\cdot}5$.

Latitude:—

$$\text{Reading} = -\ 16°{\cdot}8 \text{ S.}$$
$$\text{Factor for } 53°{\cdot}5 = {\cdot}59.$$
$$\text{True D} - \text{disc D} = +\ {\cdot}46.$$
$$\text{Correction} = +\ {\cdot}46 \times {\cdot}59 = {\cdot}27.$$
$$\text{Latitude} = -\ 16{\cdot}8 + {\cdot}3 = -16°{\cdot}5 \text{ S.}$$

Longitude:—

$$\text{L for } 9^h\ 37^m \text{ G. Civil T.} = 266°{\cdot}56.$$
$$\text{Reading} = -\ 53°{\cdot}50.$$
$$\text{Longitude} = \underline{213°{\cdot}1.}$$

(The Greenwich results for the same spot were latitude $-\ 16°{\cdot}1$ S., longitude $213°{\cdot}1$.)

EXAMPLE (2).

The nucleus of the leading spot of the great group. Type III_a.

Disc Values. Latitude $-\ 20°{\cdot}0$ S. Longitude W. $+\ 31°{\cdot}5$ W.

Latitude:—

$$\text{Reading} = -\ 20°{\cdot}0 \text{ S.}$$
$$\text{Factor for } 31°{\cdot}5 = {\cdot}85.$$
$$\text{True D} - \text{disc D} = +\ {\cdot}46.$$
$$\text{Correction} = +\ {\cdot}46 \times {\cdot}85 = {\cdot}39.$$
$$\text{Latitude} = -\ 20{\cdot}0 + {\cdot}4 = -\ 19°{\cdot}6 \text{ S.}$$

Longitude:—

$$\text{L for } 9^h\ 37^m \text{ G. Civil T.} = 266°{\cdot}56.$$
$$\text{Reading} = +\ 31°{\cdot}50.$$
$$\text{Longitude} = \underline{298°{\cdot}1.}$$

The process of measurement is made clear from Fig. 2.

APPENDIX II.

Types of Sunspots.

By the Rev. A. L. CORTIE, S.J., F.R.A.S.

[Reprinted from Vol. XI., Part II. of the *Memoirs* of the Association, by the kind permission of the author.]

The detailed examination of more than 3,000 drawings of the solar surface, obtained during the last twenty years at Stonyhurst, has shown that, in the generality of cases, all spot-groups pass through five well-defined stages in their life-histories, the fifth and last stage being a repetition of the first. They can, therefore, be classified under four distinct and generally successive types, with a fifth type to contain anomalous cases. These four types are—I. when, in the first day or two of its life, a new group consists of small scattered spots surrounded by compact brilliant faculæ of small total area ; II. when, after two days or thereabouts, the scattered spots coalesce into two main spots of a group, a very usual type of spot-group, and indicative of a new group when the faculæ cling closely to it ; III. when, between five and seven days after the first appearance of the group, detached spots bridge the gaps between the two main spots, forming with them a train ; IV. when the train disappears and leaves a single spot, which sometimes persists for two or three rotations, the faculæ becoming ever more and more branching and extended ; finally there is a reversion to type I., with this difference, however, that the faculæ are very extensive, as a rule, and not very brilliant, as opposed to the compact, brilliant, almost clotted form of the first days of the group's life-history. The types can be further subdivided so as to cover all the cases that can probably occur. They are set forth in the following table :—

Type	I. -	A group of one or more small scattered spots. The number of such spots or dots is indicated sometimes by the addition of the letters *ss*, or *sd* ; thus I. 3*ss*.
,,	II. -	The two-spot formation.
,,	II_a. -	In which the leader is the principal spot.
,,	II_b. -	In which the following spot is the principal spot.
,,	II_c. -	In which both spots are more or less equal.
,,	III. -	A train of spots.
,,	III_a. -	With well-defined principal spots.
,,	III_b. -	Without well-defined principal spots, but consisting mostly of penumbral patches with shattered irregular umbræ.
,,	IV. -	Single spots.
,,	IV_a. -	A single spot of round and regular outline.
,,	IV_b. -	A single spot of round and regular outline with small companions.

Type IV_c. - A single spot of irregular outline.
,, IV . - A single spot of irregular outline with a train of smaller companions.
,, IV_e. - A single spot of irregular outline with smaller companions not in a train.
,, V. - An irregular group of larger spots.

These types are also illustrated at the end of the Report, and for permission to copy the plate we are indebted to the courtesy of Prof. George E. Hale and the Editors of the *Astrophysical Journal.*

Four Representative Groups of Spots.

The originals of the four photographs shown on the opposite page were taken at the Royal Observatory, Cape of Good Hope. The times are all given in Greenwich Civil reckoning.

The earliest of these (Photograph A.) was taken 1910 Sept. $30^d\ 9^h\ 33^m\ 43^s$, when Group 6894 was about its greatest development. It was the last important group of the cycle ending in 1913, and was seen in three returns, this being its last. With Group 6893 it made up a magnificent curved stream, nearly $30°$ in length, visible to the naked eye (*see* pp. 33, 34).

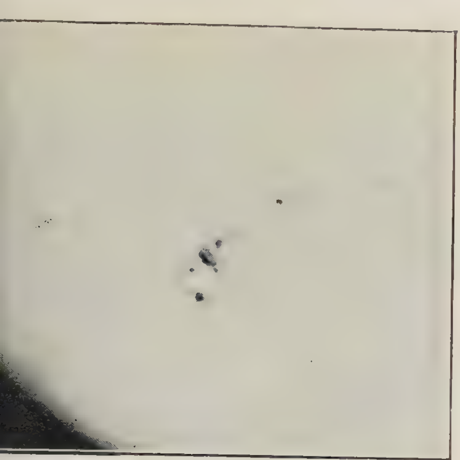
Photograph B shows the first important group of the present cycle, and was taken 1914 April $1^d\ 10^h\ 21^m\ 7^s$. It formed in the invisible hemisphere and is Group 7030 of the Greenwich series (*see* pp. 30 and 36). On April 1 it was composed of a very large main spot, followed by three small ones; but on the following days, the main spot broke up into a large number of components, and the group had extended itself into a stream extending over $12°$ of longitude by April 6.

Photograph C was taken 1917 Feb. $11^d\ 8^h\ 22\ 41^s$, and represents the first of the two giant groups of the present cycle, and one of the ten largest groups in the Greenwich series. Its form was that of a compact stream, composed of two great principal spots, closely linked by a number of small and unstable spots between.

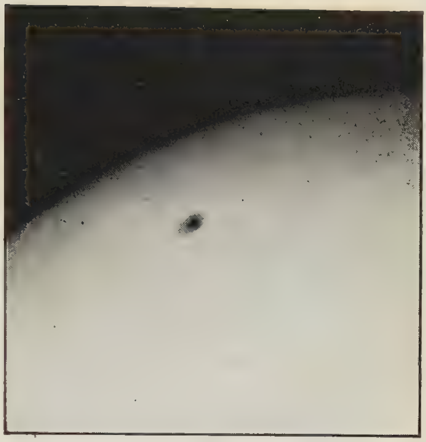
Photograph D was taken 1919 Aug. $21^d\ 13^h\ 0^m\ 11^s$. This shows a great disturbed area, in which at least three distinct groups are seen in close proximity to each other. It was one of the chief disturbances of the year.

The orientation of these photographs is the reverse of that of the two little diagrams on p. 37, which represent the Sun as seen by projection, the East being on the right, the West on the left; whereas the photographs show the Sun as seen in the sky, with the West towards the right.

Published April, 1921.

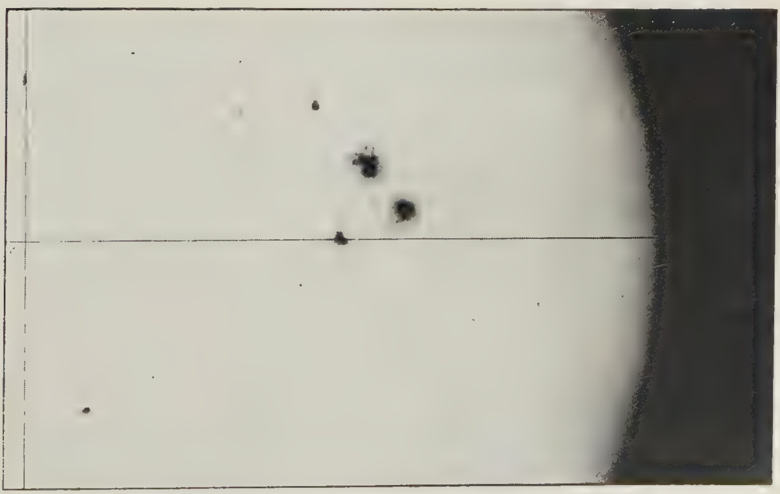


A.—1910 September 30^{d} 9^{h} 33^{m} 43^{s}.



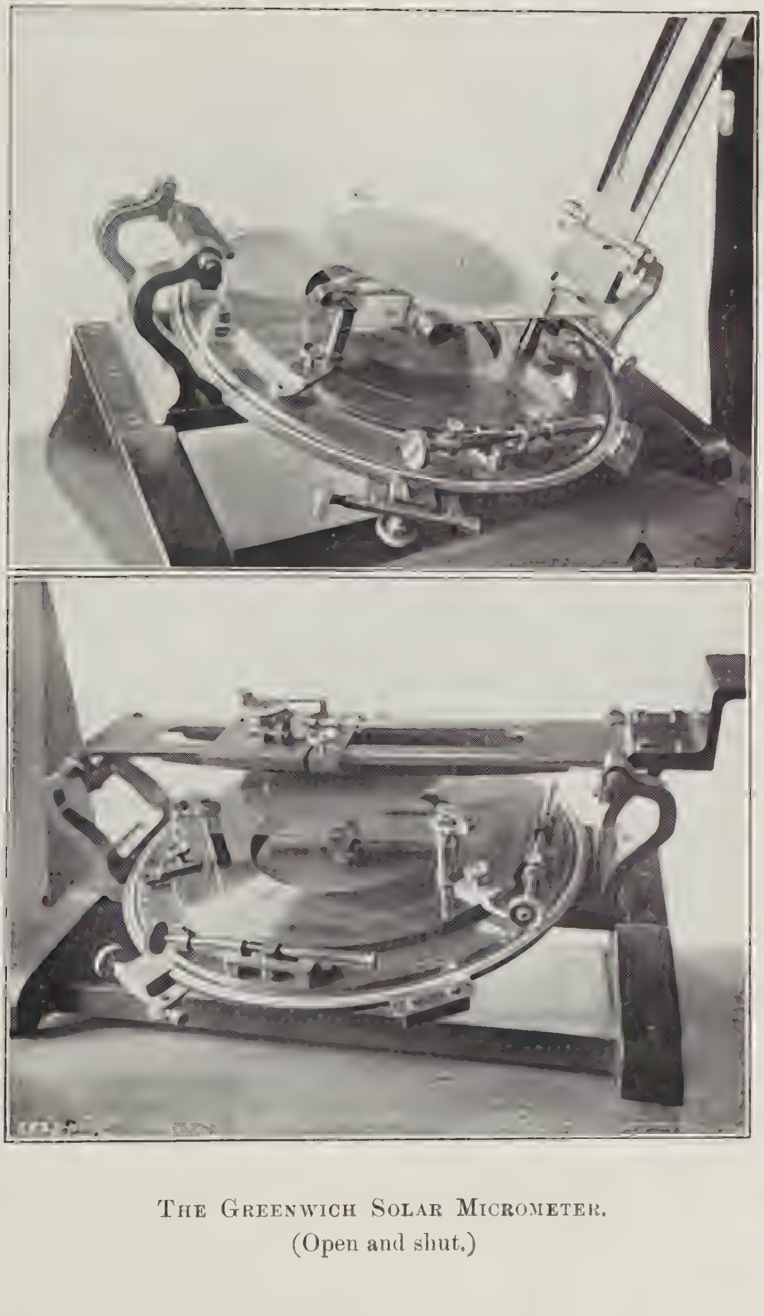
B.—1914 April 1^{d} 10^{h} 21^{m} 7^{s}.

C.—1917 February 11^{d} 8^{h} 22^{m} 41^{s}.

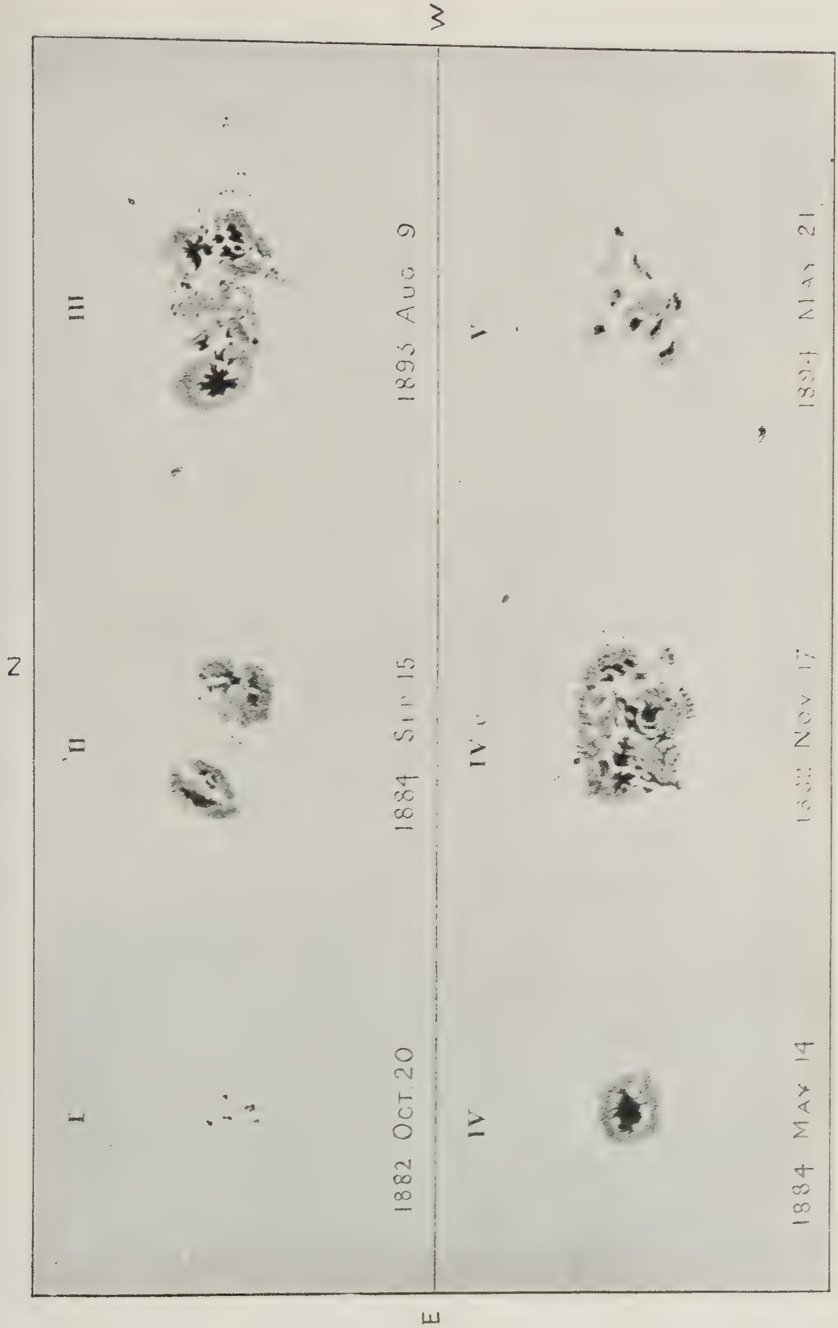


D.—1919 August 21^{d} 13^{h} 0^{m} 11^{s}.

FOUR REPRESENTATIVE GROUPS OF SPOTS.



THE GREENWICH SOLAR MICROMETER.
(Open and shut.)



Types of Sunspots.

SECTION FOR THE OBSERVATION

OF

JUPITER.

Director.—Rev. T. E. R. PHILLIPS, M.A., F.R.A.S.

NINETEENTH REPORT OF THE SECTION.

APPARITION OF 1916–1917.

INTRODUCTION.

Several causes—many of them connected with the war—have combined to delay the preparation and publication of this Memoir, for which the Director tenders his apologies to the Association; but it is hoped that those for the succeeding apparitions will be ready as speedily as possible, so as to bring the work of the Section up to date.

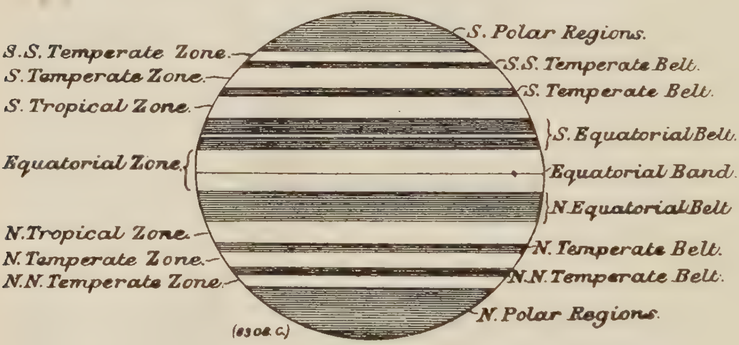
Eight Members have contributed reports dealing with the apparition under review, and, on the whole, despite inevitable interruptions, the output of work is sufficient to constitute a reliable record of Jovian phenomena at that time. Transit observations of spots and markings across the central meridian of the illuminated disc have been communicated by Instructor Commander Ainslie, Messrs. Bridger, Sargent, Thomson, Waterfield and the Director. All these, together with Mr. Smith, have contributed drawings, and the first named, who also paid special attention to the colours of the belts and zones, made between 50 and 60 whole disc drawings during the apparition—a very valuable record of the varying aspects of the planet. As in former years, Mr. Reynolds secured some excellent photographs.

The Director wishes to express the thanks of the Section to Mr. J. H. Worthington for his kindness in affording some of its Members an opportumity of making use of his fine instruments at Four Marks.

The following is a list of those from whom observations relating to the apparition of 1916–1917 have been received:—

Name.	Locality.	Instruments.
AINSLIE, Instructor Commander, M.A., R.N., F.R.A.S.	Blackheath -	9-in. spec.
BRIDGER, J. H., Mus.B. - -	Croydon - -	$8\frac{1}{2}$-in. spec.
PHILLIPS, Rev. T. E. R., M.A., F.R.A.S.	Headley, Epsom	8-in. O.G., $12\frac{1}{4}$-in. spec.
REYNOLDS, J. H., F.R.A.S. -	Harborne, Birmingham.	28-in. spec.
SARGENT, F., F.R.A.S. - -	Bristol - -	10-in. spec., 5-in. O.G.
SMITH, H. F. - - -	Luton - -	8-in. spec.
THOMSON, H., F.R.A.S. - -	Newcastle-on-Tyne.	$12\frac{1}{2}$-in. spec.
WATERFIELD, R. L., F.R.A.S. -	Four Marks, Alton.	10-in. O.G.

The nomenclature adopted in this report is the same as in former years, and is given in the accompanying diagram.



Greenwich Mean Time is used throughout this Memoir.

Since the publication of the last Memoir, the Section has sustained a very great loss by the death of the Rev. Thos. A. G. Apple. The first contribution received from him was during the 1912 apparition, and the subsequent reports show the prominent and successful part he took in the Section's activities.

Since this Memoir has been in manuscript, news has been received of the death of another Member of the Section, viz., Mr. Otto Berger. He contributed drawings and a report dealing with the observations of 1915.

APPARITION OF 1916-1917.

PARTICULARS OF PLANET'S POSITION AND OTHER DETAILS ON THE DATE OF "OPPOSITION."

Date of "Opposition": 1916 October 23^{d} 14^{h}.
Position: R.A. 1^{h} 55^{m}. Decl. 10° $10'$.
Equatorial diameter: $50''\cdot50$.
Zenocentric declination of the Sun: $+2^{\circ}\cdot96$.
Zenographical latitude of centre of the planet's disc as seen from the Earth: $+3^{\circ}\cdot73$.

NOTES ON THE GENERAL APPEARANCE OF THE DISC.

N. Polar Regions.—On the whole quiet, but a few dusky condensations were occasionally observed.

N.N. Temperate Zone.—Quiet and lightly shaded; often indistinguishable from the N. Polar shading.

N.N. Temperate Belt.—Inconspicuous generally, and often incomplete. Sargent drew it double on November 24, and the Director sometimes observed two or more components. On September 21 he saw several narrow and incomplete bands to which it was difficult to assign names, and in his notebook under November 13 he has the entry:—"There appeared about 11^h to be four broken or partial belts N. of N.T.B."

A few dark condensations were observed in this region by Ainslie, Sargent, Thomson, and the Director.

N. Temperate Zone.—Generally lightly shaded. Some of Smith's drawings show an even shading extending without interruption from the N. Temperate Belt to the pole. On the other hand he, together with Ainslie, Bridger, Sargent, and the Director, sometimes records this region as moderately bright.

N. Temperate Belt.—This was a conspicuous belt, and was often seen double, especially during the second half of the apparition. A few dark condensations were detected by Smith, Ainslie, and the Director; and the latter two observers noted a small detached dark object lying in a shallow bay on the N. edge of the belt. A small but bright spot was seen by the Director indenting the N. edge in $\omega_2 = 18^\circ{\cdot}5$ on November 13, but it was not observed again. (Plate II., fig. 6.)

N. Tropical Zone.—One of the most disturbed regions of the disc throughout the apparition. It was sometimes fairly bright, but more often lightly shaded with a number of brilliant oval spots indenting the N. edge of the N. Equatorial Belt, and enclosed by wisps of greyish material. Many of these objects were carefully and systematically followed by Members of the Section for several months.

N. Equatorial Belt.—Much disturbed and very irregular. Longitudinal and transverse rifts with bright and dark spots at the edges of the belt were frequently observed. Some of the dark spots bordering the Equatorial Zone were very soft and ill-defined, and on October 15 Ainslie wrote:—"The S. edge is fringed with fluffy markings like cotton wool."

Equatorial Zone.—Some hazy wisps and delicate soft shadings, sometimes connecting the N. and S. Equatorial Belts, were seen from time to time—Thomson writes: "Under good conditions the Equatorial Zone was seen to be full of faint detail impossible to delineate in a drawing"—but as a rule there was but little definite detail visible. Occasional fragments of the Equatorial Band were recorded by Smith, who, like Thomson, was very successful in detecting the faint equatorial markings, and the Director; but in nearly all the drawings sent in the band is entirely absent. The zone was moderately bright as a rule, but on July 8 Sargent recorded it as "exceedingly brilliant."

S. Equatorial Belt.—Most of the drawings show this belt as a broad band without the well-known rift, but Ainslie, Sargent, Smith, Thomson, Waterfield, and the Director sometimes saw it divided into two components, though usually with intermediate shading. Like the N. Equatorial Belt, the S. Equatorial Belt was sometimes very soft and diffuse along its edge bordering the Equatorial Zone (Plate II., fig. 1), and occasionally at its S. edge as well. There were a few very dark spots or short streaks in its S. component (Plate I., fig. 1; Plate II., figs. 1 and 5) and one or two bright areas near the middle of the belt.

The Great Red Spot.—This object was exceedingly difficult and generally invisible throughout the apparition, Ainslie repeatedly drew a well-defined white oval, which he called the "Red Spot;" but a comparison with the drawings of other observers shows that this was in reality the Red Spot hollow converted into an oval by curved wisps or light shadings connecting the *p.* and *f.* "shoulders" with the S. Temperate Belt (Plate I., fig. 6, Plate II., fig. 3). Within this oval outline the Red Spot itself was glimpsed with difficulty by the Director on July 30, Sept. 7 and Nov. 2, and on Oct. 4 Ainslie wrote: "The Red Spot showed a curious faint marking in its interior." The general brightness of the hollow was somewhat remarkable, and on Feb. 4 it was to Thomson one of the brightest areas on the disc. Both Sargent and Bridger remark that the hollow seemed very shallow. Its longitude (System II.) at opposition was 130°·5.

S. Tropical Zone.—Somewhat narrow but bright, probably the brightest part of the disc.

S. Tropical Disturbance.—The aspect of this object differed in some respects from that of the two previous apparitions. No part of it was specially strong and the particularly dark region which had marked the N. border along its junction with the S. Equatorial Belt had disappeared. Occasionally bright clouds seemed to lie across the belt and Disturbance extending from the Equatorial Zone to the S. Temperate Belt.

At the time of opposition the longitude (System II.) of the *p.* and *f.* ends of the Disturbance were 125° and 294° respectively, so that it extended over a length of 119°, an increase of 27° as compared with its length at the previous opposition.

The *p.* end of the Disturbance once more overtook the *f.* shoulder of the Red Spot hollow at the end of February or during the first week in March, but the bad position of the planet at the time and other adverse conditions made satisfactory observations of the conjunction impossible.

S. Temperate Belt.—Definite and fairly strong. Double in places and showing dark condensations with a few white spots at its S. edge.

S. Temperate Zone.—Rather broad and moderately bright. Thomson and the Director observed a faint narrow line upon the zone parallel to the belt in certain longitudes, and a few dusky condensations were also seen which rotated with the speed of the S.S. Temperate current.

S.S. Temperate Belt.—Broad and sometimes showing a complex structure. A few dark condensations.

S.S. Temperate Zone.—Usually somewhat dusky, and not often distinct from the S. Polar shading.

S. Polar Regions.—Very quiet and lightly shaded.

COLOUR NOTES.

Special attention has been given to the colour of the belts and zones by Ainslie, who has sent in a very full and valuable series of notes. Some colour estimates have also been contributed by Bridger, Thomson, Waterfield and the Director.

The following descriptions summarise the colour observations of the Section :—

N. Polar Regions.—Generally described as *grey*, *neutral*, or *bluish*. To Bridger on Nov. 2 the colour was *rosy grey* and to Ainslie on Nov. 26 "*brownish*." Probably about this time the tone was slightly warmer than that of the S. Polar Regions.

N.N. Temperate Belt.—Neutral grey.

N. Temperate Belt.—A very decided *bluish grey* to most observers. Waterfield describes it as *neutral grey*.

N. Equatorial Belt.—As regards colour, by far the most interesting region of the disc. Generally *grey* along its S. edge, passing into a strong *coppery red* or even *brick red* along its N. border. The coloration, however, does not seem to have been constant. According to Ainslie's notes the *coppery red* tone faded out at times, especially in the early part of October and in February, but it was usually very strong. The following extracts from Ainslie's report indicate the kind of colour-changes exhibited by this belt :—

August 7.—"S. edge of N.E.B. dark *grey*, then *brown coppery tint*, shading off through *orange* to the *yellow* of N. Tropical Zone." (20-in. reflector at Four Marks.)

October 7.—"*Copper* colour quite gone from N.E.B."

October 15.—"Colour not very definite, but there was no *red*."

October 20.—"A trace of *red* in the darker part of N.E.B., otherwise *yellow* or *brown*."

November 8.—"N.E.B. *greyish* and ill defined towards S. edge, darker or *reddish* towards N. edge."

November 11.—"Strong *red* tinge in N. edge N.E.B., and *greenish* to S."

December 1.—"The pronounced *copper red* of N.E.B. was very striking, and more so when the planet was losing itself in the haze or emerging therefrom. At times the colour seemed in the half light a *pure red*."

December 22.—"Colour of N.E.B. (N. edge) very striking; intense *dark red*. . . . . most intense in λ_2 about 30°-60° *p.* the Red spot."

January 1.—"N. edge *full orange*, very striking, and a great contrast with *bluish grey*" of N.T.B.

February 15.—"No *red* in belts."

February 21.—"No colour to speak of in the belts."

March 2.—"N.E.B. a *fiery red*."

The *greyish tone* of the S. part of the belt was well marked in the dark spots, some of them detached, which projected into the

Equatorial Zone. On September 12 Thomson wrote :—"The N.E.B. is by far the strongest belt on the disc. Along its S. edge were dark *greyish* (*blue* ?) projections into the Equatorial Zone in contrast to the colour of the N.E.B., which was *reddish brown.*" And on November 26 :—"All along the S. edge of the N.E.B. there are *greyish* projections like clouds in the Equatorial Zone." The Director also repeatedly recorded the *grey* colour of these objects, so different from the *reddish* coloration further North.

S. Equatorial Belt.—The colour reports generally make this belt *reddish* or *brownish red*, but the tone was much less intense than that of the N. Equatorial Belt. To the Director it had a good deal of *red* about it on July 20. Thomson on September 12 recorded it as *brown*, and Ainslie's full notes describe it variously as *medium brown*, *brown*, *orange red*, "*of a pinkish hue*" (January 27), &c. It was *grey* to Bridger on November 2, and Waterfield describes it as faint *bluish grey*.

On November 24 Thomson noted the *bluish grey* colour of a dark spot at the N. edge of the belt projecting into the Equatorial Zone. This spot was well observed by most of the Members of the Section who have sent in reports.

S. Temperate and S. S. Temperate Belts.—*Grey* or *neutral tinted.*

S. Polar Regions.—Pale *bluish grey*; faint *neutral grey* to Waterfield.

The *zones* generally were pale *yellow* or *whitish.* Ainslie described the Equatorial Zone as "*creamy*" on October 16, but "*white*" on August 9 and September 16. Usually the S. Tropical Zone was the whitest region of the disc, but it was closely approached by the *Red Spot hollow.*

Intensity of the Belts and Zones.

Very few direct estimates of the relative intensities of the belts and zones have been received, but the following order may be given as deduced from the general work of the Section :—

Belts.

1. N.E.B. 2. S.E.B. 3. N.T.B. and S.T.B.

Zones.

1. S. Tropical Zone. 2. E.Z. 3. N. Tropical and S. Temperate Zones.

N.B.—There was very little difference between Nos. 2 and 3 both in the belts and zones, and the adopted order was perhaps not always correct.

Polar Regions.

The *N. Polar Regions* were perhaps on the whole slightly darker than the *S. Polar Regions.*

On September 12 Waterfield recorded the Northern cap as *much* darker.

PHOTOGRAPHS.

Excellent photographs were secured by Mr. Reynolds on 1916 October 23, November 1, November 2 and December 4. On all of them the curvature of the belts, due to the tilt of the planet's axis, is seen.

The photograph of October 23 gives an admirable view of the Red Spot region, and shows the three brilliant N. Tropical spots separated by two dark projections exceedingly well. These are spots Nos. 4 to 8 in the Table of N. Tropical spots on p. 89. The S. Temperate spot, No. 3 on p. 90, also comes out prominently (Plate II., fig. 6).

The photograph of November 1 shows the N. Tropical spots Nos. 21, 1 and 2, while on the plates of November 2 and December 4 are seen the S. Tropical Disturbance and the N. Tropical spot No. 12.

LATITUDES OF BELTS.

The belts were measured for latitude by the Director on two occasions with the 8-in. refractor and power 350.

As in other years, the measures have been reduced to zenographical latitude, and the results are given in the accompanying table.

The figures for the S.S. Temperate belt show a movement towards the equator of about 4° since the previous apparition, and a similar drift, though of smaller amount, is also exhibited by the S. Temperate and N.N. Temperate belts.

Micrometer Measures of the Belts. BY THE DIRECTOR.

Part Measured.	1916 Sept. 21.			1916 Nov. 12.			Means.	
	Fraction of Polar Semi-diameter from Centre of Disc.	Zenographical Latitude.		Fraction of Polar Semi-diameter from Centre of Disc.	Zenographical Latitude.		Zenographical Latitude.	
		°	°		°	°	°	°
S. edge N. Polar shading.	+·683	+48·5		—	—		+48·5	
Spots on N.N.T.B.	+·524	+36·9		—	—		+36·9	
N.T.B. N. Edge	+·397	+28·5	+26·1	+·386	+27·6	+25·4	+28·1	+25·8
N.T.B. S. Edge	+·320	+23·6		+·317	+23·2		+23·4	
N.E.B. N. Edge	+·209	+16·6	+12·1	+·228	+17·6	+12·8	+17·1	+12·5
N.E.B. S. Edge	+·062	+ 7·6		+·072	+ 8·0		+ 7·8	
S.E.B. N. Edge	−·190	− 7·9	−13·9	−·163	− 6·4	−12·6	− 7·2	−13·3
S.E.B. S. Edge	−·378	−19·9		−·358	−18·7		−19·3	
S.T.B. N. Edge	−·474	−26·3	−27·5	−·489	−27·4		−27·5	
S.T.B. S. Edge	−·514	−28·7						
S.S.T.B.	−·641	−38·0		−·654	−39·3		−38·7	

ROTATION PERIODS.

Considering the circumstances connected with the war, the number of transit observations of individual spots and markings forwarded to the Director for discussion must be considered very satisfactory. Especially is this the case with the prominent spots associated with the N. Equatorial belt, the N. Tropical zone, the S. Temperate spots, the S. Tropical Disturbance and the Red Spot hollow. S. Equatorial spots, as for several years past, were few in number or evanescent or difficult, but a good many transits have been obtained of two of these objects. It is unfortunate, though probably inevitable, that observations of spots N. of the N. Tropical zone, and S. of the S. Temperate belt should have been so scanty, as they relate to interesting regions of the disc, and the surface currents in high latitudes seem especially to call for close study.

When the available observations are few it is naturally impossible to feel perfect confidence in one's identifications; and sometimes alternative results might be derived from the same observations, so that the adopted value of the rotation period has small weight. On this account the Director, much to his regret, has found himself unable to utilise several observations which, if others had also been available, would doubtless have been of high value; and only gives in the following Tables the results for those objects of which the identifications are reasonably assured. In some of these cases the observations are very few, but the agreement of the deduced results with others relating to the same latitude—or the description of the spots—seems to justify their use.

(In column 2, D. = dark; V.D. = very dark; W. = white; V.B. = very bright.)

N. POLAR REGIONS.

No.	Character.	ω_2 at ☊.	Limiting Dates.	No. of Observations.	Change of Longitude in 30 days.	Rotation Period.
					°	h m s
1	D. - -	133	July 30–Nov. 24	2	+4·3	9 55 46·5
2	D. - -	(235)	Nov. 12–Dec. 24	2	+2·0	9 55 43·4
3	D. - -	308	July 22–Dec. 16	2	+6·0	9 55 48·8
4	D. - -	351	Sept. 6–Nov. 8	3	+6·2	9 55 49·1

Mean rotation period = $9^h\ 55^m\ 47^s{\cdot}0$.

N.N. TEMPERATE SPOTS.

No.	Character.	ω_2 at ☊.	Limiting Dates.	No. of Observations.	Change of Longitude in 30 days.	Rotation Period.
1	D. (*p.* end)	28	Sept. 21–Dec. 17	3	+1·0	9 55 42·0
2	D. - -	125	July 30–Oct. 21	5	—	9 55 40·6
3	D. - -	125	July 30–Nov. 24	5	3·8	9 55 45·8
4	VD. (small)	292	July 19–Nov. 12	3	2·0	9 55 43·4

Mean rotation period = $9^h\ 55^m\ 43^s{\cdot}0$.

N. TEMPERATE SPOT.

No.	Character.	ω_2 at ☊.	Limiting Dates.	No. of Observations.	Change of Longitude in 30 days.	Rotation Period.
1	D. (Just N. of N.T.B.)	128	July 30–Nov. 2	5	+12·5	9 55 57.7

N. TROPICAL SPOTS.

(N. edge of N.E.B. and N. Tropical Zone).

No.	Character.	ω_2 at ☊.	Limiting Dates.	No. of Observations.	Change of Longitude in 30 days.	Rotation Period.
1	D. - -	5	Sept. 19–Dec. 16	12	− 5·0	9 55 33·8
2	W. - -	14	July 8–Dec. 9	15	− 9·0	9 55 28·3
3	D. - -	62	July 8–Jan. 6	16	− 6·6	9 55 31·6
4	W. - -	73	July 8–Feb. 15	35	− 6·5	9 55 31·7
5	D. - -	84	July 8–Mar. 2	41	− 7·2	9 55 30·7
6	W. - -	95	Sept. 7–Mar. 2	37	− 6·0	9 55 32·4
7	D. - -	104	Sept. 7–Mar. 2	38	− 7·0	9 55 31·0
8	W. - -	115	July 30–Mar. 2	38	− 5·3	9 55 33·4
9	D. - -	126	Aug. 3–Jan. 13	8	− 5·3	9 55 33·4
10	W. - -	(166)	Nov. 9 Jan. 6	5	− 4·8	9 55 34·1
11	D. - -	176	July 26–Feb. 9	18	− 6·5	9 55 31·7
12	W. - -	191	Sept. 8 Mar. 29	24	− 8·0	9 55 29·7
13	D - -	237	July 17–Dec. 4	8	−13·5	9 55 22·2
14	W. - -	252	July 17–Jan. 6	26	−16·7	9 55 17·8
15	D. - -	264	July 17–Dec. 4	6	−15·2	9 55 19·8
16	W. - -	280	Oct. 15–Mar. 8	8	− 9·8	9 55 27·2
17	D. - -	285	July 29–Mar. 8	24	−10·0	9 55 26·9
18	W. - -	(298)	Nov. 1–Dec. 19	7	− 2·0	9 55 37·9
19	W. - -	329	July 29–Jan. 10	10	− 5·5	9 55 33·1
20	D. - -	339	Oct. 15–Feb. 3	16	− 5·0	9 55 33·8
21	W. - -	355	Sept. 6–Mar. 23	26	− 5·7	9 55 32·8

Mean rotation period—$9^h\ 55^m\ 30^s{\cdot}1$.

N. EQUATORIAL SPOTS.

(S. edge of N.E.B. and N. part of Equatorial Zone).

No.	Character.	ω_1 at ☊.	Limiting Dates.	No. of Observations.	Change of Longitude in 30 days.	Rotation Period.
1	D. - -	359	July 19–Jan. 3	7	−11·7	9 50 14·3
2	W. - -	22	Sept. 27–Jan. 13	7	−14·5	9 50 10·5
3	D. - -	30	Oct. 9–Jan. 13	8	−13·0	9 50 12·5
4	W. - -	(42)	Nov. 5–Jan. 11	8	−13·7	9 50 11·6
5	D. - -	51	Sep. 16 Dec. 26	11	−12·2	9 50 13·6
6	W. - -	62	Sept. 16–Dec. 26	8	−11·5	9 50 14·5
7	D. - -	(70)	Nov. 8–Dec. 23	4	−12·5	9 50 13·2
8	W. - -	76	Sept. 23–Jan. 13	5	−11·0	9 50 15·2
9	D. - -	86	Sept. 21–Mar. 2	5	− 9·0	9 50 17·9
10	W. - -	133	July 30–Jan. 27	12	− 9·7	9 50 17·0
11	D. - -	142	Sept. 7–Jan. 4	7	−11·7	9 50 14·3
12	W. - -	152	July 30–Nov. 24	5	−14·5	9 50 10·5
13	D. - -	173	Aug. 20–Nov. 8	4	−10·2	9 50 16·3
14	W. - -	182	Aug. 20–Jan. 28	7	−10·6	9 50 15·7
15	W. - -	(213)	Oct. 31–Mar. 3	9	−11·2	9 50 14·9
16	D. - -	234	Aug. 4–Jan. 30	16	−14·0	9 50 11·2
17	W. - -	243	Aug. 4–Jan. 10	20	−12·0	9 50 13·9
18	D. - -	264	Sept. 16–Dec. 28	12	−12·8	9 50 12·8
19	D - -	280	Aug. 13–Nov. 25	4	−11·5	9 50 14·5
20	W. - -	289	July 22–Jan. 13	7	−12·0	2 50 13·9
21	D. - -	298	July 22–Jan. 13	15	−11·2	9 50 14·9
22	W. - -	311	Oct. 15–Jan. 31	7	− 8·7	9 50 18·3
23	D. - -	331	Sept. 6–Jan. 31	8	−10·5	9 50 15·9
24	W. - -	341	Sept. 6–Jan. 31	11	−11·5	9 50 14·5

Mean rotation period = $9^h\ 50^m\ 14^s{\cdot}2$.

S. Equatorial Spots.

(N. edge of S.E.B. and S. part of Equatorial Zone).

No.	Character.	ω_1 at ☊.	Limiting Dates.	No. of Observations.	Change of Longitude in 30 days.	Rotation Period.
1	W. - -	(63)	Nov. 12–Jan. 2	11	− 3·5	9 50 25·3
2	D. - -	66	July 20–Jan. 27	21	− 1·2	9 50 28·4

Mean rotation period = $9^h\ 50^m\ 26^s \cdot 8$.

Dark Spot in S. Component of S. Equatorial Belt.

No.	Character.	ω_2 at ☊.	Limiting Dates.	No. of Observations.	Change of Longitude in 30 days.	Rotation Period.
1	D. - -	—	Nov. 8–Jan. 10	4	−3·4	9 55 36·0

Red Spot Hollow.

1	*p.* shoulder	113	July 8–Feb. 13	47	−3·0	9 55 36·5
2	Centre -	130·5	July 8–Mar. 5	44	−3·0	9 55 36·5
3	*f.* shoulder	148	July 8–Feb. 9	39	−3·0	9 55 36·5

Mean rotation period = $9^h\ 55^m\ 36^s \cdot 5$.

S. Tropical Disturbance.

1	*p.* end -	175	July 19–Feb. 9	40	−9·7	9 55 27·6
2	*f.* end -	294	July 19–Mar. 8	46	−9·0	9 55 28·3

Mean rotation period = $9^h\ 55^m\ 27^s \cdot 9$.

S. Temperate Spots.

1	W. - -	0	Sept. 19–Dec. 16	10	−13·8	9 55 21·7
2	W. - -	27	July 30–Dec. 27	4	−11·0	9 55 25·6
3	D. - -	85	July 30–Nov. 21	10	−16·9	9 55 17·5
4	W. - -	186	Oct. 16–Dec. 23	5	−13·9	9 55 21·6
5	D. - -	330	Sept. 6–Nov. 20	6	−15·0	9 55 20·1

Mean rotation period = $9^h\ 55^m\ 21^s \cdot 3$.

S.S. Temperate Spots.

1	D. - -	8	Sept. 21–Nov. 8	3	−27·5	9 55 3·0
2	D. - -	65	Sept. 7–Jan. 10	5	−26·7	9 55 4·1

Mean rotation period = $9^h\ 55^m\ 3^s \cdot 5$.

SUMMARY.

Current, &c.	1916–17.		1915.		1914.	
	Rotation Period.	No. of Objects.	Rotation Period.	No. of Objects.	Rotation Period.	No. of Objects.
	h m s		h m s		h m s	
N. Polar Spots	9 55 47·0	4	—	—	—	—
N.N. Temperate Spots.	9 55 43·0	4	9 55 36·2	6	9 55 37·1	1
N. Temperate Spots	9 55 57·1	1	9 56 1·5	1	—	—
N. Tropical Spots	9 55 30·1	21	9 55 27·5	25	9 55 32·0	18
N. Equatorial Spots	9 50 14·2	24	9 50 14·8	23	9 50 17·2	22
S. Equatorial Spots	9 50 26·8	2	9 50 28·7	1	9 50 17·6	1
Spots in S.Equatorial Belt.	9 55 36·0	1	9 55 34·8	4	—	—
Red Spot Hollow, &c.	9 55 36·5	3	9 55 37·5	4	9 55 36·5	4
S. Tropical Disturbance.	9 55 27·9	2	9 55 29·3	2	9 55 27·9	2
S. Temperate Spots	9 55 21·3	5	9 55 20·9	4	9 55 20·2	5
S.S. Temperate Spots	9 55 3·5	2	—	—	9 55 6·4	2

The above table shows the only noteworthy change to have been an increase of about 7 seconds in the period of the N.N. Temperate Spots.

SATELLITE OBSERVATIONS.

On 1916 Oct. 25 Ainslie, observing III., noted that it showed a good clean disc with very little stray light, and a curved marking was visible near the centre.

Waterfield made observations of III. and IV. with the 10-in. refractor at Four Marks on 1916 Nov. 30, $6^h 40^m$ to $7^h 0^m$, but as an account of them (though without sketches) has already appeared in *Journal*, Vol. XXVII., p. 165, only a short description of them is given here. Waterfield writes :—

(1) *Jupiter's 3rd Satellite.*—A very conspicuous dark blob was visible just *s.f.* the centre of the disc. From this extended two faint streaks to the *s.p.* and *n.p.* limbs. The position, shape and size of the dark blob were accurately described by a friend who had scarcely looked through a telescope before—this shows how easy the object was ! (Plate II., fig. 7.)

Applying Steavenson's correction for the appearance of this black marking, viz., a retrogression of 1·655 days per annum, it appears that the same appearance as was seen on 1915 Sept. 7 was due about Nov. 30^d 15^h, *i.e.*, 9 hours later than the observation. Since the marking is visible for about 24 hours on end, this strengthens Steavenson's predictions.

(2) *Jupiter's 4th Satellite.*—A dusky streak running N.-S. near E. limb. Between the streak and limb a faint shading appeared. A fainter streak curved round from the S. extremity from the former streak towards S.E. limb, enclosing a sort of pole cap, which was distinctly bright (Plate II., fig. 8).

The N.-S. streak was by far the most conspicuous marking and at once struck me as resembling that seen on 1915 Sept. 5. Later on, consulting the *Nautical Almanac*, the satellite was found to be in almost exactly the same part of its orbit. In the earlier observation it was 3 days 8 hours, and in the later one 3 days 16 hours, before superior geocentric conjunction; hence there was only a difference of 8 hours, which indicates a period of rotation equal to that of revolution—a conclusion which is strengthened by the observations of 1915 Sept. 5, 6 and 7, when its slow motion across the disc was taken to imply such a rotation.

The shape and position-angle of this marking agree exactly with those of the marking seen in 1915.

It seems unlikely that this satellite behaves like III., for which Steavenson finds a slight discrepancy between the periods of rotation and revolution, for these observations, extending over more than a year, show no change of position in the marking.

Published May, 1921.

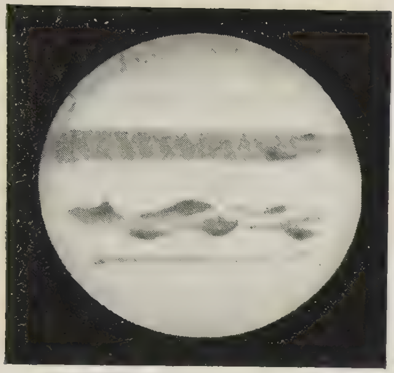


FIG. 1.—1916 Sept. 9ᵈ 12ʰ 35ᵐ
$\lambda_1 = 109^\circ \quad \lambda_2 = 55^\circ$.
R. L. Waterfield. 10-in. O.G.

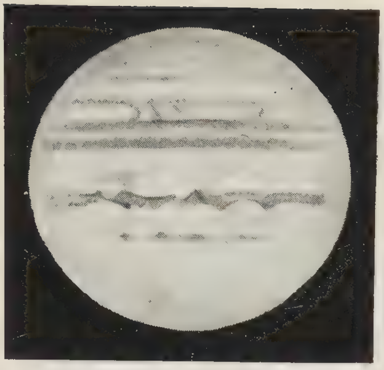


FIG. 2.—1916 Oct. 7ᵈ 10ʰ 15ᵐ
$\lambda_1 = 138^\circ \quad \lambda_2 = 224^\circ$
H. F. Smith. 8½-in. spec.

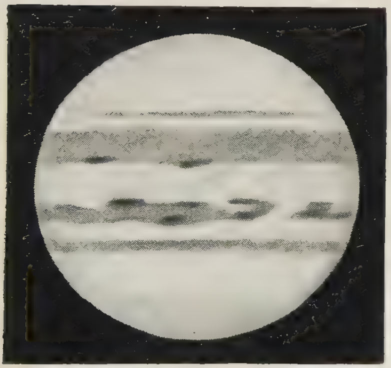


FIG. 3.—1916 Oct. 8ᵈ 9ʰ 30ᵐ
$\lambda_1 = 259^\circ \quad \lambda_2 = 345^\circ$
H. F. Smith. 8½-in. spec.

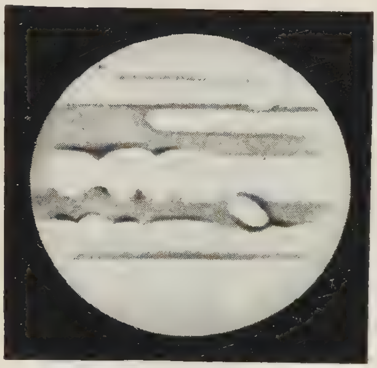


FIG. 4.—1916 Oct. 15ᵈ 9ʰ 35ᵐ
$\lambda_1 = 287^\circ \quad \lambda_2 = 320^\circ$
F. Sargent. 10-in. spec.

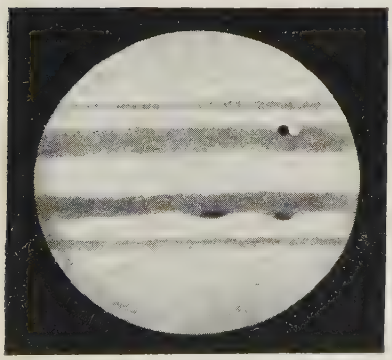


FIG. 5.—1916 Oct. 20ᵈ 11ʰ 5ᵐ
$\lambda_1 = 53^\circ \quad \lambda_2 = 46^\circ$
J. H. Bridger. 8½-in. spec.

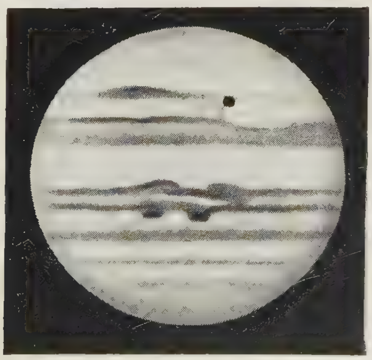


FIG. 6.—1916 Nov. 7ᵈ 7ʰ 14ᵐ
$\lambda_1 = 237^\circ \quad \lambda_2 = 94^\circ$
M. A. Ainslie. 9-in. spec.

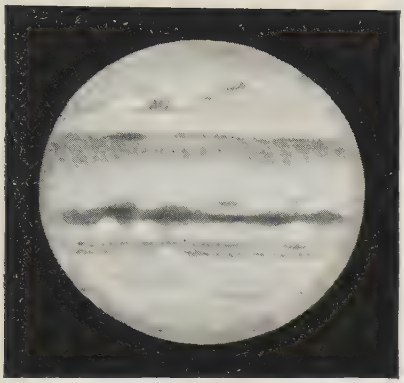


FIG. 1.—1916 Nov. 13^d 10^h 20^m
$\lambda_1 = 218°$ $\lambda_2 = 29°$
T. E. R. Phillips. $12\frac{1}{4}$-in. spec.

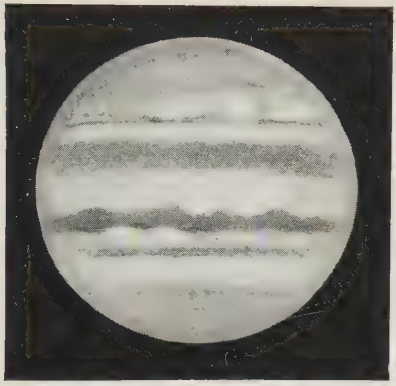


FIG. 2.—1916 Nov. 20^d 10^h 49^m
$\lambda_1 = 262°$ $\lambda_2 = 19°$
M. A. Ainslie. 9-in. spec.

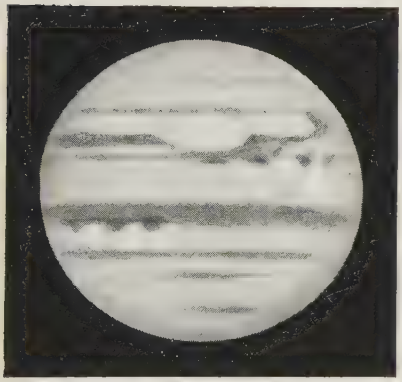


FIG. 3.—1916 Nov. 24^d 7^h 15^m
$\lambda_1 = 43°$ $\lambda_2 = 131°$
H. Thomson. $12\frac{1}{2}$-in. spec.

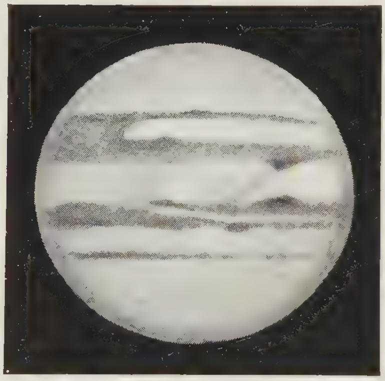


FIG. 4.—1916 Dec. 17^d 6^h 20^m
$\lambda_1 = 41°$ $\lambda_2 = 313°$
H. Thomson. $12\frac{1}{2}$-in. spec.

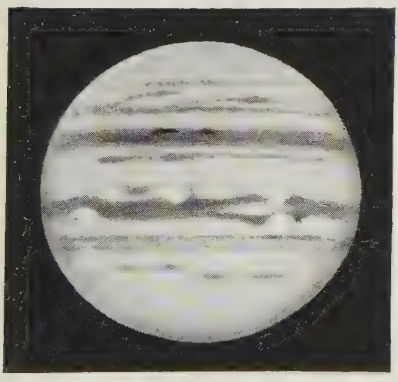


FIG. 5.—1916 Dec. 27^d 6^h 45^m
$\lambda_1 = 194°$ $\lambda_2 = 30°$
T. E. R. Phillips. 8-in. O.G

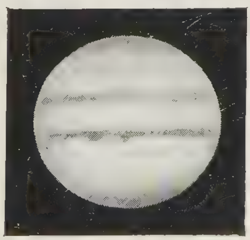
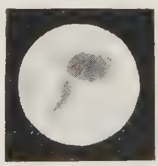
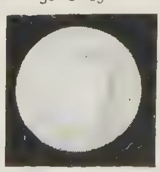


FIG. 6.—1916 Oct. 23^d 10^h 8^m ±
Drawing made from Photographs by J. H. Reynolds with 28-in. spec.



J. III. 1916 Nov. 30^d 6^h 15^m



J. IV. 1916 Nov. 30^d 6^h 20^m

FIGS. 7 and 8.
R. L. Waterfield.
10-in. O.G.

GASSENDI.—Drawn by *J. W. Durrad, F.R.A.S.*

SECTION FOR THE OBSERVATION

OF

THE MOON.

Director—WALTER GOODACRE, F.R.A.S.

EIGHTH REPORT OF THE SECTION.

Introduction.

Since the publication of the last Report in 1916 September, not much progress has been made in the work of recording fresh detail on the Moon's surface, and in this direction little can be hoped for except by the use of telescopes of large aperture, and of these there are but few in the hands of those observers who take a practical interest in Selenography.

This is to be regretted as there is still much that might be done to increase our knowledge of the Moon's surface, and thereby provide material essential for the development of any theory of lunar evolution that is based on actual observation, rather than on theoretical considerations.

No current theory of the causes which have led to the present condition of the lunar surface satisfactorily meets all objections that can be raised.

The theory ascribing the formation of the mountain rings and craterlike objects which abound on the Moon's surface to the impact of meteoric bodies is now generally discredited, but if additional arguments against it are necessary, these will be found in a close study of the superb photographs of portions of the Moon's surface taken in 1919 September by the Hooker telescope of 100 inches aperture at Mount Wilson.

A consideration of the fine detail found in these photographs, especially in relation to the many crater chains and clefts, suggests that their existence can only be accounted for on the supposition that they are due to volcanic agency, in the early days of the Moon's history.

Much of what follows in this report is based on a study of these photographs and the drawings or charts are based upon them.

The Director gladly avails himself of this opportunity of thanking Prof. G. E. Hale for the two film transparencies kindly sent by him, and would like to express the hope that opportunities may be found in the near future for taking a series of lunar photographs with this large telescope.

A complete photographic atlas made by this means would be a magnificent achievement; it would not only possess an intense

interest for students of the lunar surface, and provide a means of clearing up many matters in dispute, but it would become of increasing value as time went on. Much of the detail shown in these photographs is so fine that it would require telescopes of 6 inches aperture and upward to reveal it, even under conditions of the best seeing.

The Mount Wilson Photographs.

In response to an appeal by the Director, Dr. Hale has kindly sent the following details of the method of taking these fine photographs, and which it is thought will be of interest to the Members of the Section :—

"The photographs were taken with the 100-in. reflector at the Cassegrain focus, the focal length being 1606 inches, full aperture of 100·375 inches being used.

"S–23 plates were used, the plates being stationary and the shutter moved across. The exposure varied from $\frac{1}{4}$ second at the limb to two seconds at the terminator."

Tycho and District.—The Mount Wilson photograph is of special value as it gives details of several interesting objects which have never been properly seen before, nor shown on previous photographs or maps, and it should throw valuable light on the origin of the forces which are responsible for the present appearance of this part of the Moon's surface.

The objects in question are a number of parallel clefts radiating from Tycho and seen more particularly on the N.W. side of this crater. These clefts extend for many miles and bear witness to the violence of the forces which formed them.

On examination, the photograph shows that they consist of crater chains and rugged valleys, and an attempt has been made to reproduce them on the chart herewith.

These details are quite beyond the reach of small telescopes.

There are indications of similar radiating valleys on the S.E. side of Tycho, though traced with difficulty.

These radiating lava valleys are not confined to the Tycho district; they are to be found associated with several other craters of similar type, such as Copernicus and Theophilus.

Thebit. The Straight Wall. Birt.—The Mount Wilson photograph reveals a large amount of detail not previously recorded.

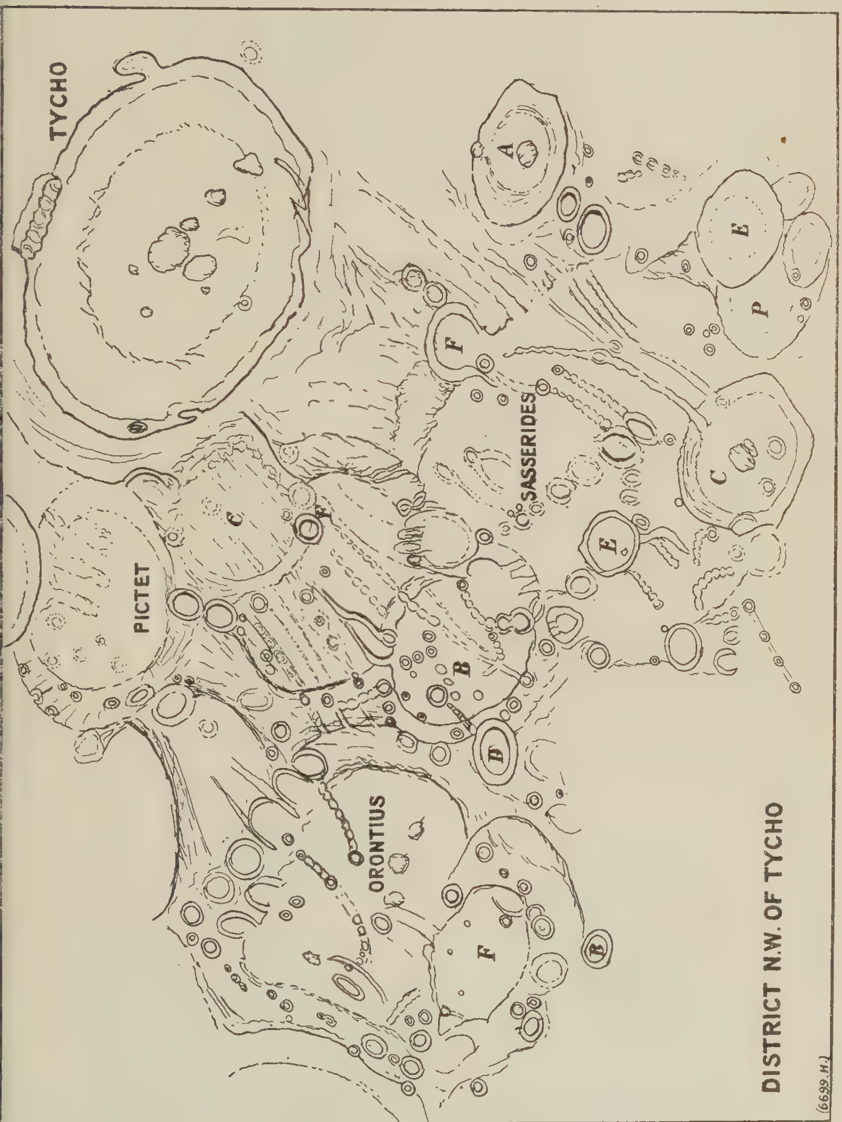
The chart now published is based on this photograph. In this district of the Moon's surface, Schmidt's map shows 40 or 50 craters, whilst the Director's map records about 60.

On the other hand, about 120 can be counted on the chart. Many of these are mere craterpits and not easily seen, so that considerable telescopic power is necessary to reveal their existence.

In the photograph it is seen that the "straight wall" is not perfectly straight, having many curved sections in its length.

To the E. of Birt is a deep rugged gorge or cleft which commences and ends in a craterlet; at its N. end it presents for some miles the appearance of a crater chain.

On several occasions a continuation of this cleft as a fine line running S. beyond Birt has been seen—by Madler, 1834 July 28th, Campbell and Neison 1878 August 20th, and on the next day by Gaudibert; Molesworth has seen a white line in the



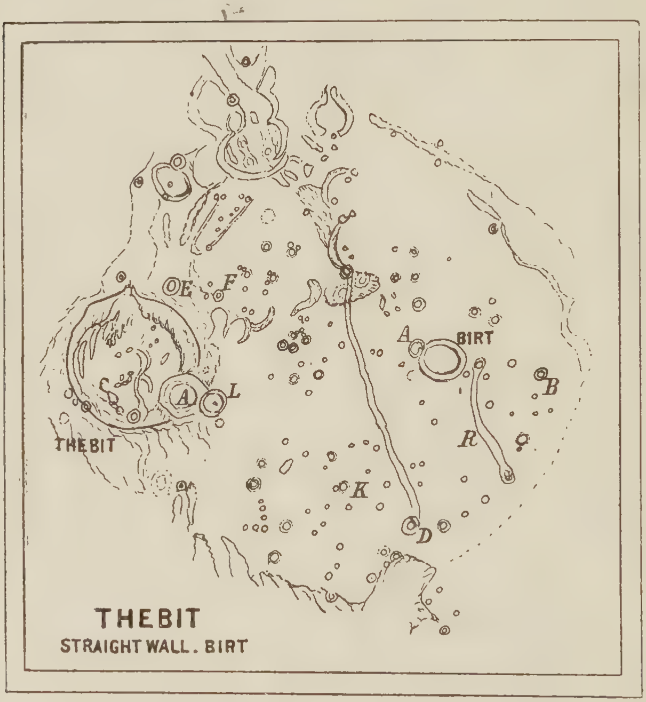
position of this supposed cleft and subsequently, in 1896 June 3rd, saw it very distinctly.

Schmidt, however, does not show it on his map, and the photograph gives no indication of its presence, so its existence must still be regarded as doubtful.

It is curious that in Schmidt's map the cleft *R* on the E. side of Birt is figured as being convex to the E., whereas the photograph confirms other maps in showing it to be convex to the W.

Birt. A.—Dr. W. H. Steavenson called attention some time ago to a peak in the interior of this small crater on the S.W. flank of Birt which he found with a 28-in. refractor.

The photograph confirms the existence of a minute object close to the E. wall of *A*, but it suggests that it is a large landslip from the wall, and this may account for the break in the wall seen at sunrise when the shadows of the interior of Birt and *A* merge into one.



The late Major Molesworth records that he once found, in 1896 April 23rd, what appeared to be a large central mountain in *A*, which he had not previously noticed.

This may be the peak independently discovered by Dr. Steavenson.

Gassendi.—No detailed drawing of this interesting formation has previously appeared in the reports of the Section.

The Members are, therefore, indebted to Mr. J. W. Durrad, F.R.A.S., for sending his beautiful drawing, made by him as long ago as 1877 January 25th, which accompanies this report.

Nearly all the selenographers have given much attention to Gassendi, and especially Neison, who publishes a fine chart in his

work on the Moon, and also Fauth, who has devoted much time to the study of the details on its interior.

His map of Gassendi shows more detail than any other map, and a copy has been made so far as the craterlets and clefts he shows are concerned (*see* below), and it will be interesting to compare it with Mr. Durrad's fine drawing given as a Frontispiece to this report.

Fauth shows 30 distinct clefts, including three crater chain clefts, of which No. 8 is the principal.

This object should be looked for, as it does not appear in the other charts, neither do the two to the E. of cleft No. 9.

Clefts 10, 11, 12, 13, 14, 18 are not shown on any other map and require confirmation.

On the other hand, Mr. Durrad shows several clefts not in Fauth's chart, and he is to be congratulated in having produced

GASSENDI
SHEWING CLEFTS & CRATERLETS ACCORDING TO FAUTH

so fine a drawing containing more detail than that published by any other English observer.

Numbers 1, 2, 3, and 4 are easily seen with moderate apertures, but of the others, most require considerable optical power and steady air to render them visible.

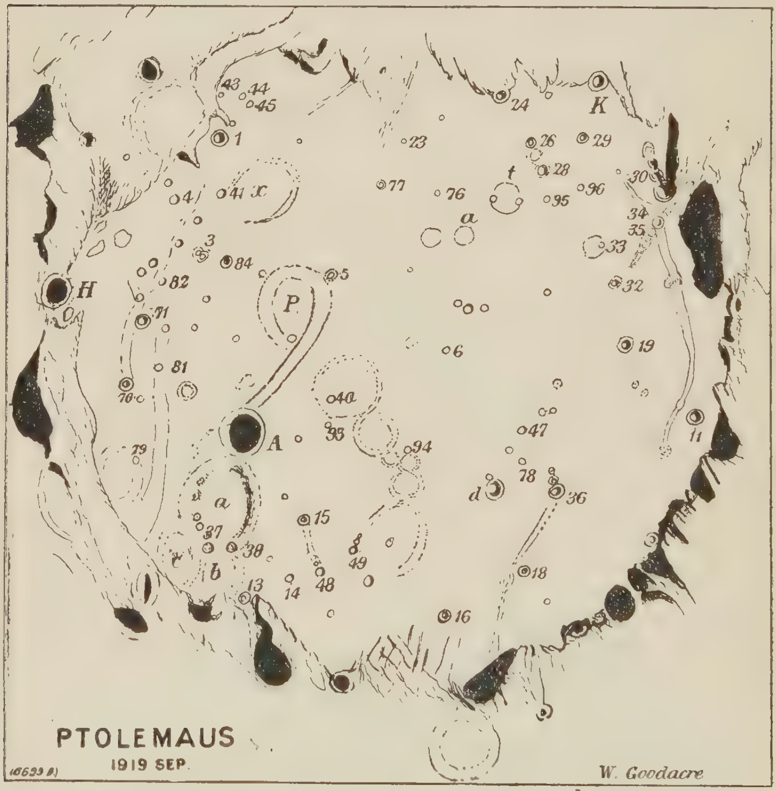
As regards the Craterlets.—Those near 1 and 3, and that which is intersected by cleft No. 6, are easy objects and appear in most maps, but the others must be delicate objects, seen with difficulty, as very few of them have been seen by others than Fauth.

Ptolemaus.—This interesting formation has been under examination by the Section for a long period, and the record is one of growing value.

Hitherto, Plato has been the one lunar formation about which our knowledge of its surface details has been more complete than that of any other object on the Moon's surface.

Its pre-eminence in this respect is now seriously challenged by Ptolemaus, thanks in no small measure to the wealth of new detail revealed by the Mount Wilson photograph.

Space will not permit of even a *résumé* of what has been accomplished by the Members of the Lunar Section in connection with the mapping of the details found on the floor of this formation. These particulars will be found running through all the reports of the Section so far published, and the story shows



what can be accomplished by persistent efforts directed to one end.

The accompanying chart is based on the photograph referred to and will be found to show many more objects than appear in the chart by Mr. Saunder, published in the Sixth Report of the Lunar Section.

In that chart about 60 craterlets are inserted, whereas the present chart shows about 100.

The agreement between the two on the whole is very close.

In a few cases only, objects shown by Saunder are not visible in the photograph; but, on the other hand, there is a considerable number of new objects not detected by that observer.

A comparison has also been made with Krieger's finished drawing in his Moon atlas, made in 1897, when the Sun's altitude was very similar, but under morning light. In Krieger's drawing a distinct cleft is shown parallel with the W. wall, and a short distance from it. This has often been looked for by Mr. Saunder and others, besides the Director, without success. Neither does the photograph give any indication of it. It does, however, show very faintly in about the same position a curved shallow valley, which Krieger might have thought to be a rugged cleft, but without justification. There is a well-known cleft under the E. wall shown by most observers and this is easily seen on the photograph and is shown to be longer than it is generally seen.

The Director has, however, traced it as far as the N. wall, where it joins one of the broad passes or valleys which cut through it.

Naturally under the somewhat high angle of illumination in the photograph, the well-known saucer-like depressions are scarcely seen, but their presence is indicated by white patches, and several additions to the list of those objects can now be made.

Another interesting fact may be mentioned.

In Saunder's chart there is a crater marked 6, the existence of which that observer very much doubted, as he was never able to detect it.

The photograph, however, shows a crater in or near the same position, so that there can be little doubt that Elger was right in entering it upon his chart.

Running from craters 36 to 18 the photograph shows a faint line or marking, which is probably the boundary of the well-known dark area extending some distance on the floor from the N.E. wall and is in the position where several observers have suspected the existence of a cleft.

On the photograph the principal crater *A* is filled with shadow, so that we are not helped to settle the question of the existence or otherwise of a central peak, once found by Mr. Bridger.

There is no trace on the photograph of crater No. 83 on Saunder's chart, and, as it is not shown by any other authority, doubts may be held as to its existence.

The crater chain from 34 to 32 is now recorded for the first time.

Clavius.—The Mount Wilson photograph shows Clavius just before sunset, and is, therefore, of much value, as most drawings are made of this object when near the morning terminator.

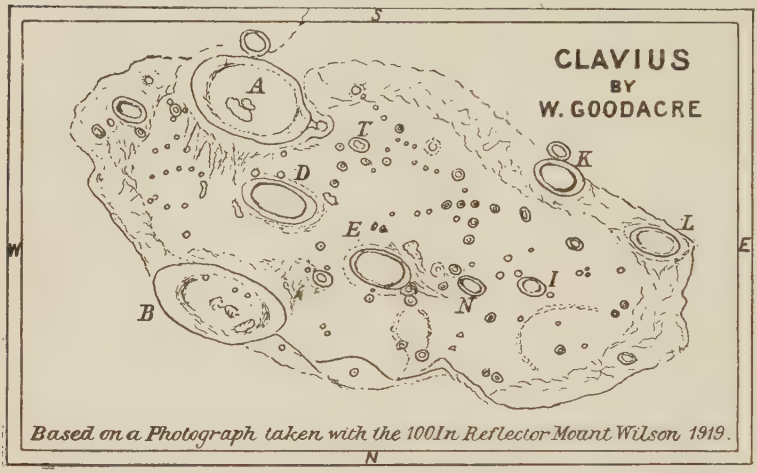
The chart is based on the photograph and shows a large amount of detail.

The only chart in existence comparable with it is that by Krieger in his Moon atlas and made with the aid of a 10-in. refractor.

It speaks volumes for the excellence of the photograph that Krieger does not show anything that cannot be found on it.

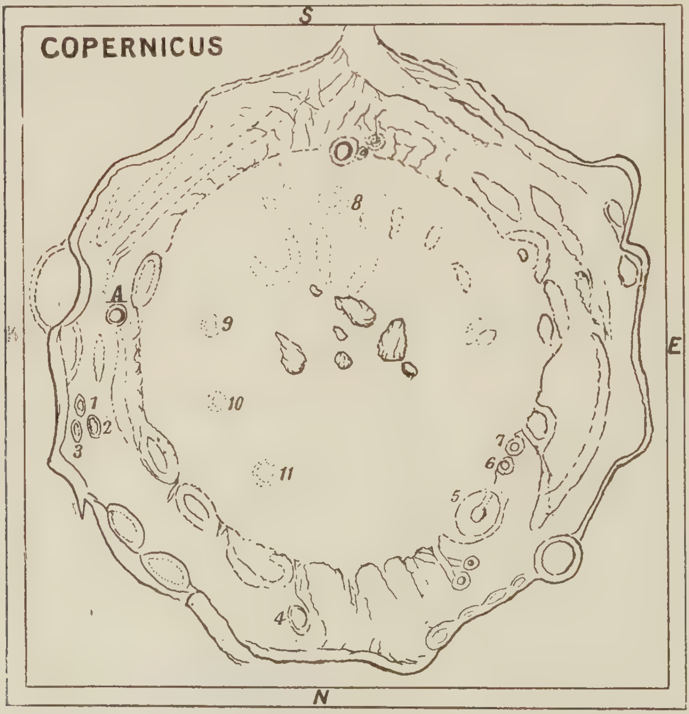
Attention may be called to the minute craters between *D* and the west wall, arranged in a horseshoe curve. These have only been recorded by Krieger and are not found in any other map or photograph.

It has often been remarked that no clefts have been found on the floor of Clavius, and none are shown in the photograph.



Based on a Photograph taken with the 100 In. Reflector Mount Wilson 1919.

Copernicus.—A very fine view of this object is given by the Mount Wilson photograph, for, although it was some distance from the terminator when the photograph was taken, the amount



of fine detail shown is remarkable and some of it is now recorded for the first time.

Elger says there are five small mountains near the centre, but the photograph shows seven.

Molesworth on one occasion saw a delicate cleft running from the centre towards the south wall and when about half that distance it turned sharply to the east. No one else had recorded this cleft and no sign of it appears on the photograph.

It is curious that no craterlets have been found on the floor.

Neison shows one in contact with the north wall, but here again it is not shown on the photograph, which would in all probability be the case if it existed.

The chart accompanying this report shows some craters and craterlike formations on the inner slopes of the rampart, some of which are well known, but those marked 1, 2, 3, 4, 5, 6, 7 are now recorded for the first time.

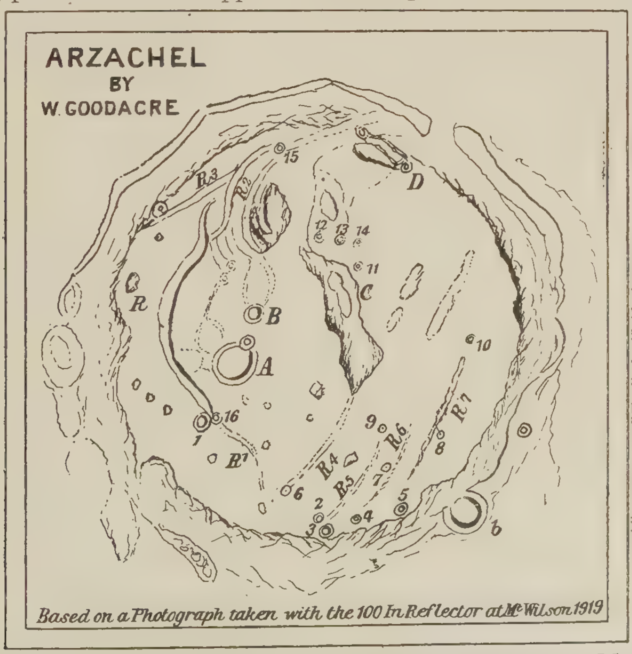
The objects marked 8, 9, 10, 11 are faint white rings which are likewise noted for the first time, and are evidently the sites of submerged crater rings.

No. 5 is a curious flat-topped hill with a craterlike opening on the summit having a channel-like opening on its south side.

The outline of this formation as given on the chart should be useful to observers in saving time when making drawings of this formation.

Mr. Bridger has found a bright line running from the south-west wall to the central mountains, also a small crater at the foot of the inner slope of the south wall, close to the east side of the one shown in the Director's map.

Arzachel.—No chart or drawing of this prominent mountain-ring plain has hitherto appeared in the reports of this Section and



to supply this lack, the accompanying chart, based on the Mount Wilson photograph, has been made.

It will be found to contain a good number of details not previously recorded.

Schmidt's map shows 12 craters on the floor, but the chart shows nearly twice as many.

Those numbered 6 to 16 are very delicate, and would tax a telescope of considerable power.

In addition, there are several new clefts marked *R*, *R* 1, 2, 3, 4, 5, 6, 7, the last 4 being very difficult objects.

To the west of *A* are evidences of two submerged rings and a shallow valley running S. to two unmarked craterlets. These features are also seen for the first time.

The Director on one occasion found a craterlet between *A* and the central mountain. This is not visible on the photograph, as its site was probably immersed in the shadow of the latter.

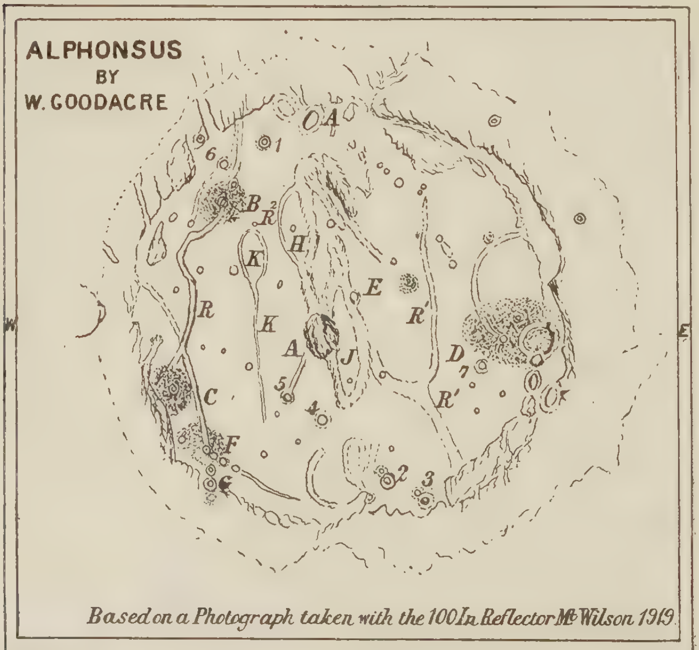
In addition to the foregoing, it will be seen that there are a number of ridges and isolated hills.

Alphonsus.—This formation has not received the amount of attention from the Members of the Lunar Section that it deserves, seeing it is one of the most interesting walled plains and favourably situated near the centre of the disc.

On the interior are a number of objects which will repay careful and systematic study.

The most striking features are the three well-known dark spots, two of which are close to the wall on the western side and the other close to the eastern wall.

Alphonsus is very well shown on the Mount Wilson photograph, and a careful examination of the same reveals a wealth of detail recorded for the first time.



Based on a Photograph taken with the 100 In. Reflector Mt Wilson 1919.

(8639 M)

The accompanying chart is based on this photograph.

The three dark spots are marked *B C D*, the latter being the largest.

There is also another small dark area marked *E* well known, but omitted from some maps. The photograph shows in addition another dark area N. of *C* and surrounding the craterlet *F*. Through this dark area the course of the cleft can be distinctly seen as a crater chain.

All these spots, except perhaps *E*, have craterlets near the centre, and in the case of *B*, *C* and *F* are connected by means of wide, deep clefts.

These dark spots are probably the result of dark matter ejected from the central craterlets, though some observers think it represents vegetation of some kind.

The cleft *R* is well known, but that portion running N.W. from *F* is very delicate and not often seen.

The chart shows about 50 craterlets—a number far in advance of any previous record.

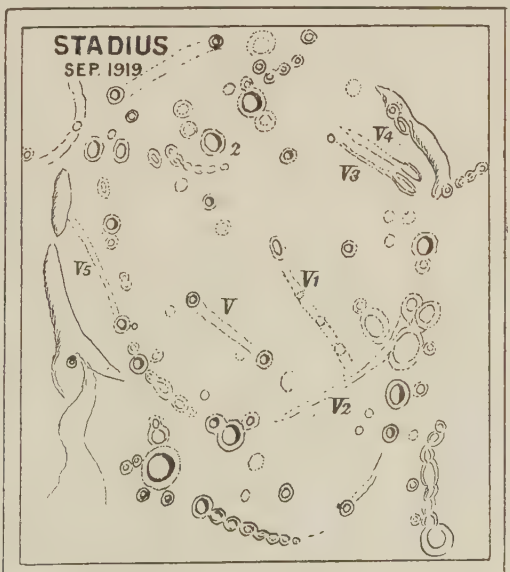
The object marked *K* is a very faint shallow valley extending for many miles to the N., where it gradually fades out. A similar and even more delicate feature is the long valley or cleft marked R' and another is found at R^2.

Those numbered 1 to 7 are the most conspicuous craters.

Molesworth once saw a small dark spot near the S. wall and close to the crater *A*.

This is absent from the photograph and may have been only the shadow cast by one of the small hills in that position.

Stadius.—This interesting specimen of an ancient ring plain whose walls have been reduced to fragmentary portions and in many places have disappeared altogether, is well shown on the



(6699 A)

Mount Wilson photograph of September 15th, 1920, notwithstanding at the time it was a considerable distance from the terminator.

The chart now published is based on this photograph, and should be compared with that to be found in Vol. XXI. of the *Journal B.A.A.*, p. 168.

Though the present chart does not contain all the details given in the previous one, it contains some new objects not previously recorded, notably some shallow valleys *V*, *V*1, *V*2, *V*3, *V*4, *V*5.

There is also a curved crater chain just N. of the crater marked 2.

Evidently a great many more objects exist on the interior of this formation than have been detected.

Mare Imbrium.—Very fortunately one of the Mount Wilson photographs depicts the whole of this vast area—the western half exceptionally well; the eastern half, being further from the terminator, is not quite so satisfactorily shown.

A chart, facing p. 106, has been made of this *Mare*, all the details of which have been taken from the photograph.

This gives a good idea of the immense number of objects, which far exceeds anything shown in the existing maps.

A rough count of the craters and craterlets gives a total of rather more than 700 of these objects, many of which are of extremely small size.

Schmidt's map only gives about 400. About 300 objects are therefore shown for the first time.

An observer, by the use of a powerful telescope, would have occupied very many years in recording the whole of these details, which have been secured by a photograph in less than 2 seconds of time.

Miscellaneous Observations.

Arago.—The cleft from this crater running S.E. was seen by the Director in 1915 December 12th as a fine dark line extending past Sosigenes.

Delisle.—Miss Grace Cook has recorded a craterlet on the N.E. wall not shown in the Director's map.

Dopplemayer.—Mr. J. H. Bridger has sent a finished drawing, dated 23rd March, 1918, showing that the central mountain is cut through by a deep valley or ravine. This has also been seen by the Director, 14th February, 1916, but does not appear to have been previously noticed. The Director has found evidences of a ruined ring as large as Dopplemayer on the *Mare* to the N.E. and in contact with Dopplemayer.

Encke and Kepler.—Occupying nearly all the space between these formations is an obscure or ruined ring plain not shown on any of the maps. Its interior, when near the terminator, is seen to be covered with minute hills—seen by the Director, 1920 January 31st.

Furnerius.—Capt. Bougon has sent a sketch of this formation, which shows a branch of the well-known longitudinal cleft running down the centre and marked *R* on the Director's map. This new branch commences just S. of *B*, and inclines to the S.E., terminating in a little crater.

Major Molesworth made a sketch of Furnerius in 1896 October 24th which shows all the details given on Capt. Bougon's sketch, but not this short cleft now recorded for the first time.

Kies.—The Director has traced a bright ragged line running across the floor N. to S. which may be a cleft.

Lee.—The Director found, 14th February, 1916, a cleft commencing at the N.E. wall and running S.W. across the floor almost as far as the opposite boundary.

Mare Humorum. Eastern Edge.—The Director found—1918 March 25th—a short rugged cleft running outwards through broken ground from the cleft *R* 4 marked on his map. It commences just N. of the unmarked crater which stands on the cleft and in the same latitude as the crater *N*; also, another short cleft was seen further to the S. and on the *Mare* close to the crater *G* and running towards *E*.

Marco Polo.—About 3 diameters to the N.W. in the Apennines Mr. Bridger has detected two craterlets not on the Director's map.

Mersenius.—The Director noted on October 27th, 1917, a narrow bright line, probably a cleft, running tangentially from the W. wall across the interior to the N.E. as far as the centre. It commences at a little crater just S. of *M* (shown on the Director's map) and terminates at another, which craterlet is the most northerly one of the crater chain running down the centre of Mersenius.

Pitatus.—Mr. Bridger has had this formation under observation, but fails, like others, to find any craterlets on its lagoon-like surface. He finds the southern half of the floor darker than the northern half.

Santbech.—The Director has found a small hill between the central mountain and the E. wall not previously recorded.

Schroeter's Valley.—A series of nine drawings has been received from Capt. Bougon, made at Amiens with a 10-in. reflector, illustrating his observations of this interesting valley and its supposed connection with Herodotus. These confirm the drawing in the last report of the Section (page 101) made by the late Mr. Burgess, which suggests the continuation of the valley as cutting through the dark mountain mass, where most observers find it appears to terminate. Mr. H. P. Wilkins's observations confirm Capt. Bougon's.

The Director's most recent observations suggest that a narrow valley runs round the foot of the dark mountain mass on its *F* side and may eventually be found to debouch on the floor of Herodotus.

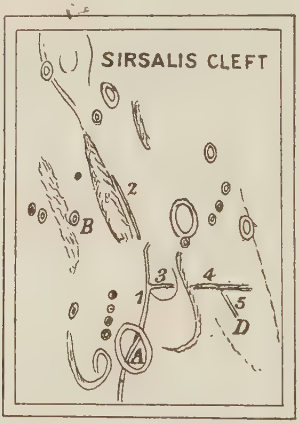
However, observations with large telescopes just before sunset are necessary to decide this matter finally.

Secchi.—The Director found in 1920 February 23rd two rugged clefts parallel and running from the N.E. wall nearly as far as *F*.

Sinus Medii.—On the 2nd May, 1914, under a low angle of illumination, the Director found that the crater *B* stands at the centre of a large elliptical ruined ring plain, on the western boundary of which stands the crater *E*.

The Sirsalis Cleft.—The accompanying sketch by Capt. Bougon shows some new features.

The clefts numbered 3 and 5 confirm No. 45 in Gaudibert's



sketch dated 1873 December 19th, published in the *English Mechanic*, and the Director independently recovered it later.

The cleft No. 4 is new, as well as the eastern extension of No. 3. Most observers, however, see No. 2 on the west side of the mountain ridge as shown in the Director's map.

If this region were carefully and persistently examined with large telescopes, there is little doubt but that other branches of the main cleft would be detected.

This main cleft was found by Gaudibert to cut through the N. wall of *A*, and this was confirmed by the Director in 1915 March 29th; it seems to pass under the wall on the opposite side.

Sulpicius Gallus.—Running N.E. along the margin of the *Mare* as far as the crater *D* two parallel clefts are shown on the Director's map.

He has since seen a third, which is parallel to the others and nearer the edge of the *Mare* and much shorter in length—30th March, 1917.

Vitello.—The Director's map shows a wide gap in the N. wall. The ring, however, was seen complete by him, but very low at that point, on 26th March, 1915.

Published August, 1921.


CHART
OF THE
MARE IMBRIUM.
BASED ON A
MOUNT WILSON PHOTOGRAPH.
1919. SEPT.
Autolycus
Archimedes
Aristillus
Thaetetus
Cassini
Plato
Le
(6699.G)

Memoirs

OF THE

ritish Astronomical Association.

EDITED BY

A. S. D. MAUNDER, F.R.A.S.

REPORTS

OF THE

OBSERVING SECTIONS.

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1924.

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P 19525

SECTION FOR THE OBSERVATION

OF

JUPITER.

DIRECTOR—REV. T. E. R. PHILLIPS, M.A., F.R.A.S.

TWENTIETH REPORT OF THE SECTION.

APPARITION OF 1917–1918.

INTRODUCTION.

The Director regrets the delay, to which several causes have contributed, in the publication of this Memoir. It is hoped that it may be possible to prepare the succeeding ones more speedily and to make up some of the arrears.

The Memoir is based on the reports of ten Members of the Section, and, considering the war-time conditions, the work contributed is very satisfactory in amount as well as in quality. Special reference may be made to the very full reports of Instructor Commander Ainslie, Mr. Sargent and Mr. Thomson. It was also particularly gratifying to receive again, after an interval of several years, some notes and a number of transit observations from Mr. A. Stanley Williams.

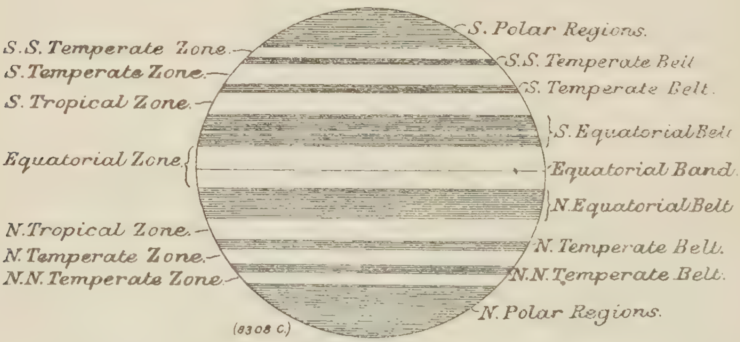
The following is a list of those from whom observations relating to the apparition of 1917–1918 have been received :—

Name.	Locality.	Instruments used.
AINSLIE, Instructor Commander, R.N., M.A., F.R.A.S.	Blackheath -	9-in. spec. and other instruments.
BERGER, E. O. - - - -	Berne, Switzerland.	$4\frac{1}{4}$-in. O.G.
BRIDGER, J. H., Mus.B. - -	Croydon - -	$8\frac{1}{2}$-in. spec.
PHILLIPS, Rev. T. E. R., M.A., F.R.A.S.	Headley, Epsom	8-in. O.G., $12\frac{1}{4}$-in. and 18-in. spec.
REYNOLDS, J. H., F.R.A.S. -	Harborne, Birmingham.	28-in. spec.
SARGENT, F., F.R.A.S. - -	Bristol - -	10-in. spec., 5-in.O.G.
STEAVENSON, Dr. W. H., F.R.A.S.	Headley, Epsom	8-in. O.G.
THOMSON, H., F.R.A.S. - -	Newcastle-on-Tyne.	$12\frac{1}{4}$-in. spec.
WATERFIELD, R. L., F.R.A.S. -	Cheltenham -	4-in. O.G. and other instruments.
WILLIAMS, A. S., F.R.A.S. -	S. Mawes, Cornwall.	$6\frac{1}{2}$-in. spec.

By the kindness of Mr. J. H. Worthington, F.R.A.S., the fine instruments at the Four Marks Observatory were again used occasionally by some of the Members of the Section.

Reference was made in the previous Memoir to the loss the Section has sustained by the death of Mr. E. Otto Berger. He contributed observations relating to the 1915 apparition, and the apparition under review in this Memoir.

The nomenclature adopted in this report is the same as in former years, and is given in the accompanying diagram.



During the apparition under review, a faint belt and zone were observed still further North than the N.N. Temperate Zone. They are designated the N.N.N. Temperate belt and zone respectively in the Memoir.

Greenwich Mean Time is used throughout this Memoir.

APPARITION OF 1917-1918.

PARTICULARS OF PLANET'S POSITION AND OTHER DETAILS ON THE DATE OF OPPOSITION.

Date of Opposition : 1917 Nov. 28^d 17^h.
Position of planet : R.A. 4^h 19^m. Dec. $+ 20° 31'$.
Equatorial diameter : $49''\cdot4$.
Zenocentric declination of the Sun : $+ 2°\cdot87$.
Zenographical latitude of centre of planet's disc as seen from the Earth : $+ 3°\cdot48$.

NOTE ON SEEING-CONDITIONS AND INSTRUMENTS.

The apparition was a very favourable one for Northern observers, and there were many nights when the conditions were really excellent. The Director found that he was frequently able to use the 18-inch With reflector bequeathed to the Association by the late Mr. N. E. Green (since the summer of 1917 erected at Headley) with advantage, owing to its splendid light grasp, and the $12\frac{1}{4}$-inch Calver was on many occasions utilised, as well as the 8-inch Cooke refractor lent by the Royal Astronomical Society.

On September 14 he recorded that the image of Jupiter was equally steady in the 8-inch and 18-inch telescopes—remarkable testimony to the character of the seeing.

On December 19, when the 18-inch, which is mounted in the open, was not used owing to deep snow and frost, the Director made the following entry in his observation book :—

"In the best moments the $12\frac{1}{4}$-inch distinctly beat the 8-inch, and about midnight it showed a marvellous structure of minute flecks and stipplings which it was altogether impossible to delineate ! The surface structure presented a similar aspect to that of 1916 November 12."

It may be remarked that under ordinary conditions the 8-in. is unquestionably the most serviceable instrument of the three for planetary as well as double star work, owing to its steadier images and more uniformly good performance; but under the *finest* conditions the reflectors have a distinct advantage for the observation of the colours as well as of the structure of the surface features. For the study of the discs of the satellites, and micrometer measures of the planet's belts, the Director invariably uses the refractor, as being the more suitable type of instrument for that class of work.

NOTES ON THE GENERAL APPEARANCE OF THE DISC.

N. Polar Regions.—Usually very lightly shaded, but occasionally drawn moderately dark by Ainslie in the earlier part of the apparition. Some dark spots and condensations were observed very far North by Ainslie, Thomson, and the Director.

N.N.N. Temperate Zone.—A white spot was observed here by Thomson on December 8.

N.N.N. Temperate Belt.—A narrow, faint and fragmentary belt, frequently observed by Ainslie, Thomson and the Director. It showed a few condensations and a gap.

N.N. Temperate Zone.—Differed little, if at all, in intensity from the other zones north of N. Temperate Belt.

N.N. Temperate Belt.—Fairly strong in places, but not continuous.

N. Temperate Zone.—Similar to N.N. Temperate Zone.

N. Temperate Belt.—Quite a strong belt. Sometimes seen double with dark condensations at the edges by Ainslie, Sargent and the Director in the earlier part of the apparition; but single, and without detail later. Two minute white spots were seen by Ainslie at its south edge on August 26 and one at its north edge on August 24.

N. Tropical Zone.—Fairly bright, with white spots and some short dark streaks near north edge of N. Equatorial Belt, some of them completely detached from the belt. One of these spots is probably identical with No. 17 in the table of N. Tropical spots in the Memoir for the apparition of 1916–17. (*Mem.*, Vol. XXIII., Part III., p. 89).

On September 26 the Director noted in certain longitudes a narrow and feeble line north of N. Equatorial Belt and in the same latitude as the detached dark N. Tropical spots.

N. Equatorial Belt.—A strong dark belt, somewhat narrower than during the previous apparition. Very irregular, with dark projections and white spots at both edges. Some bright rifts cutting through the belt transversely and connecting the Equatorial and N. Tropical Zones.

Equatorial Zone.—Rather bright, with a large number of white areas near the south edge of the N. Equatorial Belt which were commonly bounded by curved dusky wisps. The narrow Equatorial band very fragmentary and rarely observed separately from the wisps enclosing the white spots. A few spots also seen in southern part of the zone bordering the S. Equatorial Belt, some of them exhibiting an abnormally slow rate of rotation for the latitude (*see* page 39).

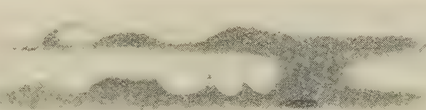
S. Equatorial Belt.—Usually drawn double, the two components being separated by a bright longitudinal rift. Much detailed structure seen at times (Plate I., figs. 4 and 5; Plate II., fig. 2). There was also a prominent trumpet-shaped opening into the Equatorial Zone (Plate I., fig. 1) in the region of the abnormally slow rotation mentioned above. Some narrow dark streaks observed in the S. portion of the belt by Ainslie, Thomson and the Director (Plate II., fig. 1), and a few dark projections with intermediate bright bays bordering the S. Tropical Zone.

The Red Spot.—This object, which had been exceedingly faint and difficult, and usually invisible, in 1916–17, showed a marked revival, and was repeatedly observed by Ainslie, Sargent, Thomson, Williams and the Director (Plate I., figs. 4, 5 and 6; Plate II., fig. 5) Frequently, though not always, seen as an elliptical grey shading with darker margin, and, as usual, some-

Dec. 27. Williams. (Red Spot.)

what more pronounced towards its *f* end. A white spot seen by Williams in the channel between the Red Spot and S. Equatorial Belt near *p* end of spot on December 27 (sketch). The Hollow well-defined throughout the apparition. The longitude (System II.) at opposition was 77°.

S. Tropical Zone.—A fairly bright zone, with a few white spots and dusky wisps crossing it from projections at S. edge of S. Equatorial Belt, especially near *p* end of the Disturbance (sketch).



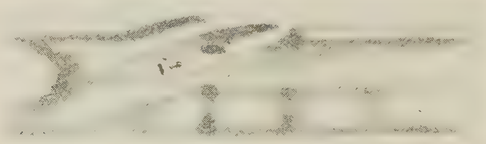
Oct. 19. Phillips. (South Tropical Zone.)

S. Tropical Disturbance.—The *p* end invisible at the beginning of apparition, though conjunction with Red Spot had probably begun some time before. The *p* end first seen definitely by the Director on September 26, in longitude 29° (System II.) or 40° from the *p* shoulder of Red Spot Hollow, but almost certainly identical with a hump at S. edge of S. Equatorial Belt observed by the Director on August 24 in longitude 46°, and on September 21. After the latter part of September, the *p* end developed and extended in longitude, forming a well-defined shoulder on the S. Tropical Zone (Plate I., fig. 6; Plate II., figs. 1 and 6). The disturbance very faint between this shoulder and the *p* shoulder of Red Spot Hollow throughout the apparition. As usual during conjunction with Red Spot, the Disturbance showed a marked increase in length as compared with its previous dimensions. At opposition its *p* and *f* ends respectively at 8° and 175° (System II.) giving a length of 167° as compared with 119° and 92° at the two previous apparitions. The development of a bright elliptical spot between *f* end of Red Spot and the

following portion of the Disturbance is a remarkable feature of the apparition (Plate II., fig. 5).

A paper by the Director on Atmospheric Refraction on Jupiter (*Journal*, Vol. XXVIII., p. 214) suggests the possibility of rapid change in this marking somewhat analogous to that described by Molesworth in *M.N.*, LXV., 704.

S. Temperate Belt.—Varied much in different longitudes; being in some places obviously double and strong, in others single and faint, or with a fine narrow line as its S. component. A few bright spots and dark condensations, and in one place



Sept. 30. Phillips.

(longitude 341° at opposition) a marked thickening of the belt, which was a conspicuous feature throughout the apparition. On September 30 the Director found it cut through by a couple of transverse rifts (sketch).

S. Temperate Zone.—A certain amount of complex detail seen in this zone in the form of narrow lines with dark condensations (Plate I., fig. 2; Plate II., figs. 2 and 5).

S. S. Temperate Belt.—Showed variations in intensity at different longitudes, with a few small dusky condensations and some minute white spots resembling satellites in transit (Plate II., fig. 1).

S. S. Temperate Zone.—Quiet, and not often distinguishable from the S. Polar shading.

S. Polar Regions.—A dusky band occasionally seen at N. edge of the Polar shading. Usually nothing to distinguish the Polar area from the S. S. Temperate Zone, the whole region being lightly shaded.

PHOTOGRAPHS.

Two excellent photographs of the planet were secured by Mr. Reynolds with his 28-inch reflector as follows:—

1917 Nov 11. $\lambda_1 = 9°$; $\lambda_2 = 251°$.

Shows dark spots on S. Temperate Belt, the longitudinal rift through S. Equatorial Belt, and irregularities at S. edge of N. Equatorial Belt. The N. Tropical Zone is clearly the brightest on the disc.

1917 Dec. 17. $\lambda_1 = 67°$; $\lambda_2 = 43°$.

Shows *f* end of dark preceding portion of S. Tropical Disturbance and faintness of the Disturbance between this and the Red Spot Hollow. Red Spot Hollow approaching C.M.

Two white N. Tropical spots. The N. Tropical Zone the brightest on the disc.

The photographs show very plainly the curvature of the belts due to the planet's axial tilt.

COLOUR NOTES.

As during the previous apparition, special attention was given to the colours of the disc by Ainslie. Colour notes have also been contributed by Bridger, Thomson, Waterfield, Williams and the Director.

The observations are summarised as follows :—

N. Polar Regions.—Bluish or *pale bluish grey.*

N. Temperate Belt.—Generally *blue.* *Very blue* according to Ainslie on Aug. 16. *Slate coloured* to Thomson on Nov. 12 and 14. The disc was usually *bluish* or *greyish* from this belt to the Pole.

N. Tropical Zone.—Not distinctively coloured. Ainslie refers to the fading of the white N. Tropical spots of the previous apparition, together with the detachment of the dark "Capes" to form isolated spots which he designated "barges" and which he described as "*chocolate red.*" Williams also estimated spot No. 7 in the table of N. Tropical spots as having a *redness* equal to 6 on a scale of 1–10.

N. Equatorial Belt.—Sometimes recorded by Ainslie as *yellowish* or *orange* at its N. edge, but usually as *reddish* elsewhere, especially in the centre. At times he considered the colour *brick-red.* Bridger and Waterfield found the belt *chocolate brown.* Thomson *slaty grey, sepia* or *dark brown.* It was *brownish grey* to the Director on Aug. 19, when the S. Equatorial Belt was recorded as *reddish* brown, but as a rule there was a decided tinge of *red* in the belt.

Equatorial Zone.—White, but not conspicuously so.

S. Equatorial Belt.—Colour variable or patchy, even more so than that of N. Equatorial Belt. Thomson described it as *yellowish brown* on Nov. 12 and 14 and Dec. 8; Bridger as *chocolate brown* on Dec. 10. To the Director it appeared *neutral grey* on July 22, *reddish brown* on Aug. 19, but with little distinctive colouring on Dec. 19 and Jan. 29. Ainslie considered it *brick red* at times, at others as *brown* or even *bluish.* Waterfield on Jan. 8 noted the general difference between the two equatorial belts, the Northern being of a rich *chocolate red,* while the Southern was *salmon pink.* On the whole a *warm tone* predominated, but it was rather less intense than that shown by the North Equatorial Belt.

The Red Spot.—No red or warm tone seen. Colour *grey.*

S. Tropical Disturbance.—Thomson noted on Nov. 12 that the colour of the *p* end of the Disturbance was *brown,* but of a darker shade than the adjoining S. Equatorial Belt. It was in marked contrast to the S. Temperate Belt, which was *purple* or *slate* in colour.

S. Temperate Belt.—Slate colour to Thomson, *greenish* to Ainslie on Oct. 13.

S.S. Temperate Belt.—Greenish to Thomson on Nov. 14.

S. Polar Regions.—Described by Ainslie as *yellowish brown* on July 28, and by Thomson as *greenish* on Nov. 14 and Dec. 8. Generally a contrast was noticeable between the comparatively *warm tone* of this region of the disc, and the *bluish grey* which extended over the greater part of the Northern hemisphere.

INTENSITIES.

Several estimates of the relative intensities of certain features were made by Members of the Section, and the following order represents the mean results :—

1. *N. Equatorial Belt.*

2. *S. Equatorial Belt.*—Thomson considered it equal to the N. Equatorial Belt, but spoke of the difficulty of comparing objects differing in colour. Ainslie, on February 8, found the N. edge the darkest part of the disc.

3. *N. Temperate Belt.*—Bridger estimated it as equal to, and sometimes surpassing, the S. Equatorial Belt. On December 19 it was, to the Director, the darkest marking on the disc, and on March 8 Berger found it considerably darker than the S. Equatorial Belt.

4. *S. Temperate Belt.*

On October 18 Ainslie rated the Equatorial Zone as the brightest part of the disc; but usually the N. Tropical Zone came first. This is also the order on the photographs, but the difference is only slight.

LATITUDES OF BELTS.

Micrometer measures of the belts were made by Thomson and the Director. The latter, in these observations, used the 8-in. Cooke refractor, and he believes that in all micrometer work a refractor has a great advantage over a reflector, owing to its (usually) greater focal length and the greater steadiness of the images. It will be seen, however, from a comparison of the results obtained, that, despite a somewhat greater spreading of the individual measures made with the reflector, as is only to be expected, the mean values in the two tables are in very satisfactory accordance. It is hoped that more Members of the Section will take up this department of work.

As in former years, the measures have been reduced to Zenographical Latitude. A comparison of the deduced latitudes with those of the previous apparition ("Nineteenth Report of the Section," Vol. XXIII., Part III., p. 87) shows no change of importance to have occurred, the only noticeable feature being a shrinkage of about 2° in the width of the N. Equatorial Belt, with a slight motion towards the Equator. The change was mainly shown by the N. edge of the belt.

MEASURES BY MR. HAROLD THOMSON. (12½-inch Reflector.)

Part measured.	1917 November 10			1917 November 19			1917 December 3			Mean Zenographical Latitude.	
	Fraction of Polar Semi-diameter from Centre of Disc.	Zenographical Latitude.		Fraction of Polar Semi-diameter from Centre of Disc.	Zenographical Latitude.		Fraction of Polar Semi-diameter from Centre of Disc.	Zenographical Latitude.			
		°	°		°	°		°	°	°	°
Spots in N. Polar Shading	—	—		+ ·673	+ 47·3	—	+ ·784	+ 56·8		+ 52·0 (2 spots)	
N.N.N.T.B.	+ ·586	+ 41·1	—	—	—		—	—		+ 41·1	
N.N.T.B.	—	—		—	—		+ ·557	+ 39·0		+ 39·0	
N.T.B. (Centre)	+ ·348	+ 25·1		+ ·327	+ 23·8		+ ·339	+ 24·5		+ 24·4	
N.E.B. N. Edge	+ ·192	+ 15·3	+ 10·7	+ ·124	+ 11·1	+ 7·9	+ ·141	+ 12·2	+ 8·7	+ 12·9	+ 9·1
N.E.B. S. Edge	+ ·044	+ 6·2		+ ·020	+ 4·7		+ ·030	+ 5·3		+ 5·4	
S.E.B. N. Edge	— ·167	— 6·7	— 12·3	— ·218	— 9·9	— 14·0	— ·172	— 7·0	— 10·2	— 7·9	— 12·2
S.E.B. S. Edge	— ·343	— 17·9		— ·346	— 18·1		— ·274	— 13·4		— 16·5	
S.T.B. Centre	— ·505	— 28·6		— ·500	— 28·3		— ·397	— 21·4		— 26·1	
S.T.B. S. Component	—	—		—	—		— ·517	— 29·4		— 29·4	
S.S.T.B.	—	—		— ·534	— 30·6		— ·671	— 40·7		— 35·6	

MEASURES BY THE DIRECTOR. (8-in. Refractor, Power 350.)

Part measured.	1917 Aug. 29. Fraction of Polar semi-diameter from centre of disc.	1917 Aug. 29. Zenographical Latitude.		1917 Sept. 23 Fraction of Polar semi-diameter from centre of disc.	1917 Sept. 23 Zenographical Latitude.		1917 Sept. 26 Fraction of Polar semi-diameter from centre of disc.	1917 Sept. 26 Zenographical Latitude.	
		°	°		°	°		°	°
Spot in N. Polar Shading.	+—	—	—	—	—		—	—	
N.N.N.T.B.	+·617	+43·2		+·583	+40·8		+·638	+44·8	
N.N.T.B.	+·552	+38·5		—	—		+·500	+35·1	
N.T.B. S. Edge	+·405	+28·7	+26·0	+·409	+29·0	+26·7	+·417	+29·6	+26·7
N.T.B. N. Edge	+·319	+23·2		+·335	+24·3		+·325	+23·7	
N.E.B. S. Edge	+·152	+13·0	+9·7	+·165	+13·5	+10·4	+·145	+12·4	+9·7
N.E.B. N. Edge	+·048	+6·4		+·055	+6·9		+·058	+7·0	
S.E.B. S. Edge	—·179	—7·6	—13·1	—·145	—5·3	—11·3	—·172	—7·0	—13·5
S.E.B. N. Edge	—·351	—18·5		—·334	—17·3		—·377	—20·0	
S.T.B.	—·483	—27·2		—·448	—24·7		—·498	—28·2	
S.S.T.B.	—·603	—35·7		—·656	—39·6		—·643	—38·5	

Part measured.	1917 Nov. 16 Fraction of Polar semi-diameter from centre of disc.	1917 Nov. 16 Zenographical Latitude.		1917 Dec. 23 Fraction of Polar semi-diameter from centre of disc.	1917 Dec. 23 Zenographical Latitude.		1918 Jan. 31 Fraction of Polar semi-diameter from centre of disc.	1918 Jan. 31 Zenographical Latitude.		Mean Zenographical Latitude.	
		°	°		°	°		°	°	°	°
Spot in N. Polar Shading.	+·741	+53·0		—	—		—	—		+53·0	
N.N.N.T.B.	—	—		—	—		—	—		+42·9	
N.N.T.B.	—	—		—	—		—	—		+36·8	
N.T.B. S. Edge	+·392	+27·9	+25·7	+·404	+28·6	+25·5	+·421	+29·7	+27·0	+28·9	+26·3
N.T.B. N. Edge	+·320	+23·4		+·307	+22·4		+·342	+24·4		+23·6	
N.E.B. S. Edge	+·164	+13·5	+10·0	+·172	+14·0	+10·1	+·183	+14·4	+10·9	+13·5	+10·1
N.E.B. N. Edge	+·048	+6·5		+·046	+6·2		+·067	+7·3		+6·7	
S.E.B. S. Edge	—·154	—6·0	—12·9	—·155	—6·1	—13·4	—·153	—6·2	—12·6	—6·4	—12·8
S.E.B. N. Edge	—·373	—19·8		—·384	—20·6		—·356	—19·0		—19·2	
S.T.B.	—·464	—25·8		—·516	—29·5		—·473	—26·9		—27·0	
S.S.T.B.	—·617	—36·6		—·641	—38·5		—·601	—35·7		—37·4	

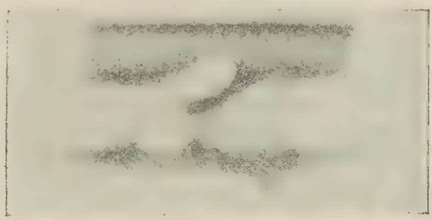
ROTATION PERIODS.

A large number of transit observations was obtained by the Section during the apparition, and the results deduced from them show one or two points of special interest. The rotation periods of individual spots are given below, and in the summary which follows the mean values for the separate currents are compared with the corresponding figures for the two previous apparitions.

It will be seen that there was an acceleration in the motion of the spots observed in the N.N. Temperate Belt, and that there were two objects on the narrow belt a little further North (called the N.N.N. Temperate Belt) of which the rotation period was still less. On the other hand, no spots situated in the slow N. Temperate current were sufficiently well observed to render the identifications reliable. Accordingly, no results are given for that part of the disc.

There was a marked falling off in the number of North Tropical spots, but the drift of the surface material in this latitude showed little, if any, change. On the other side of the N. Equatorial Belt (N. Equatorial spots) the activity was fully as great as, or even greater than, before, no less than 30 spots being tabulated. The rotation period showed an increase of about 5 seconds as compared with that of the previous apparition.

But it is in regard to the South Equatorial spots that the most remarkable results have been found. It will be seen that the mean rotation period is about half a minute longer than during the two previous apparitions, but an inspection of the figures of the individual spots reveals a still more astonishing state of affairs. It will be seen that for one spot (sketch) the rotation period comes out as great as $9^h\ 51^m\ 21^s{\cdot}8$,



Sept. 26. Phillips.

which is about three-quarters of a minute longer than that of the quickest moving spot, while the periods of two others exceed $9^h\ 51^m$! These large values, if real, are quite abnormal, though Mr. Sargent has drawn attention to one or two other objects in this latitude which have subsequently exhibited a similar rate of motion (*M.N.*, LXXXI., 521, and LXXXII., 418). Similar periods have also been recorded by W. Herschel, Denning, and others.

In order that the reader may be able to judge of the trustworthiness or otherwise of the identifications, a portion of the spot chart for this region of the disc is appended on which all observed positions of spots are entered. It is possible that spot 3 might follow the broken line after the observation of October 13,

which would mean a considerable acceleration of its motion. In this case Mr. Williams's observation of October 30 will refer to another object. This, however, seems to the Director very unlikely, and at any rate there can be no doubt whatever as to the soundness of the identifications between September 20 and October 13. Further, the slow rotation of this spot makes it likely that the identifications of the neighbouring spots 1 and 2 are also correct, though the observations are few and scattered and the Director attaches but little weight to the derived results.

The following are the details of the observations of spot 3 :—

Date.	Time of Central Meridian Passage.	Longitude (System I.).	Notes.	Observer.
1917.	h m	°		
Aug. 18	16 23	9·8	—	Sargent.
,, 21	13 15	8·8	Rough estimate - -	Phillips.
,, 25	15 50	14·7	—	Ainslie.
Sept. 1	15 33	29·5	—	Sargent.
,, 20	13 3	58·4	—	Phillips.
,, 20	13 5	59·6	Dark - - - - -	Ainslie.
,, 26	16 47	62·7	Dark excrescence from S.E.B.	Phillips.
Oct. 1	14 55	64·2	Soft smudgy projection from S.E.B., greyish.	Phillips.
,, 4	11 59	70·8	Rather prominent projection	Phillips.
,, 10	15 50	79·5	Dark and prominent with wisp *np*.	Phillips.
,, 13	12 48	82·5	—	Ainslie.
,, 30	8 50	103·5	Small dark projecting spot -	Williams.

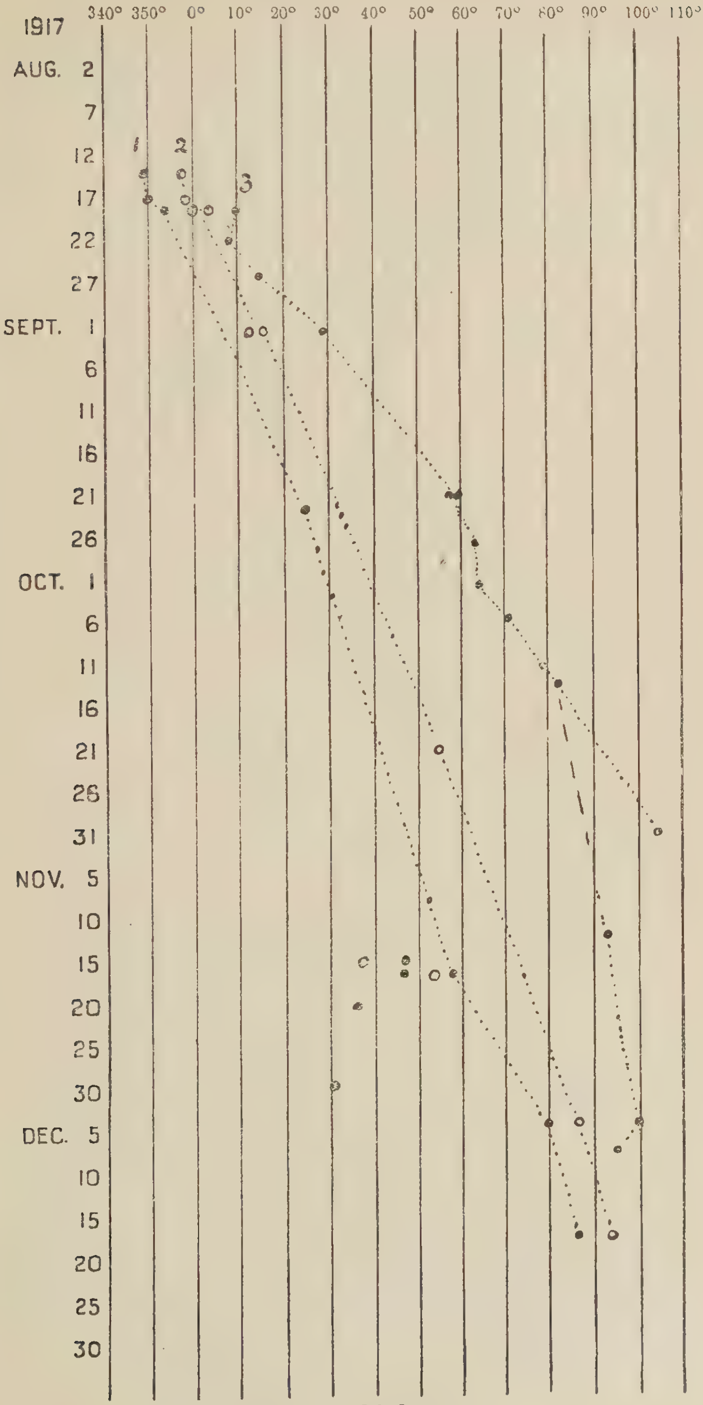
The spot is also well shown on a drawing of Sept. 14 by the Director, but it is too far from the central meridian for an accurate value of its position to be determined.

The Director noted on Sept. 26 that the object seemed plainer and more prominent when near the *f* limb than when near the central meridian. This suggests that it may have been at a higher level in the Jovian atmosphere than the normal equatorial spots.

Turning now to the S. Tropical regions of the planet, it will be seen from the Table that there was a slight acceleration in the motion of the Red Spot, but this was only to be expected since the object was in conjunction with the S. Tropical Disturbance, and at such times an acceleration invariably takes place. What is more remarkable is the fact that in the same latitude there were other objects which moved more slowly. One of these was a " shoulder " situated within the Disturbance which was seemingly stationary in longitude (System II.) for four months, but then showed a remarkable acceleration. Another was a bright spot *f* the latter object and *p* the Red Spot Hollow. It drifted at a very uniform rate, and seems to have been overtaken by the *p* shoulder of the Red Spot Hollow at the end of March, after which it was not seen. A third object (first recorded

S. Equatorial Spots. (Nos. 1, 2 and 3.)

● = dark spot. ○ = white spot.



on Dec. 2) followed the Red Spot, and its slower motion and its development caused a remarkable extension of the white area between the *f* end of the Red Spot and the succeeding portion of the Disturbance. It appeared as if the White Spot was caused by a cloud or perhaps by an eruption of white material which either overlay or repelled the dark material of the Disturbance. This is the bright elliptical object referred to on p. 33 in the Description of the South Tropical Disturbance.

There was nothing of a remarkable nature in the rotations exhibited by the spots observed further South. The South Temperate and S.S. Temperate currents usually show deviations of motion differing but slightly from the mean values.

N. POLAR SPOTS.

(In column 2, D = dark, W = white.)

No.	Character.	ω_2 at ☊.	Limiting Dates.	No. of Observations.	Change of Longitude in 30 days.	Rotation Period.
		°			°	h m s
1	D - -	(70)	Dec. 14–Mar. 11	7	+ 3·5	9 55 45·4
2	D - -	145	Jan. 2–Feb. 15	4	+ 8·2	9 55 51·9
3	D - -	(93)	Nov. 12–Dec. 19	8	+12·3	9 55 57·5

Mean rotation period = $9^h\ 55^m\ 51^s{\cdot}6$.

N.N.N. TEMPERATE SPOTS.

No.	Character.	ω_2 at ☊.	Limiting Dates.	No. of Observations.	Change of Longitude in 30 days.	Rotation Period.
1	D - -	60	Sept. 30–Jan. 29	6	− 8·3	9 55 29·3
2	Gap in belt	67	Sept. 30–Jan. 29	3	− 8·7	9 55 28·7

Mean rotation period = $9^h\ 55^m\ 29^s{\cdot}0$.

N.N. TEMPERATE SPOTS.

No.	Character.	ω_2 at ☊.	Limiting Dates.	No. of Observations.	Change of Longitude in 30 days.	Rotation Period.
1	D - -	(68)	Sept. 27–Oct. 19	6	+ 0·3	9 55 41·0
2	*p* end of No. 3	203	Nov. 9–Mar. 2	6	− 4·3	9 55 34·7
3	D - -	220	Sept. 23–Dec. 3	5	− 0·6	9 55 39·8
4	D - -	232	Sept. 23–Dec. 3	4	− 3·7	9 55 35·6
5	*f* end of No. 4	241	Sept. 7–Dec. 8	6	− 4·7	9 55 34·2

Mean rotation period = $9^h\ 55^m\ 37^s{\cdot}1$.

N. TROPICAL SPOTS.

(N. Edge of N. Equatorial Belt and N. Tropical Zone.)

No.	Character.	ω_2 at ☊.	Limiting Dates.	No. of Observations.	Change of Longitude in 30 days.	Rotation Period.
1	D - -	3	Aug. 24–Feb. 9	19	− 8·8	9 55 28·6
2	W - -	11	Sept. 20–Feb. 9	10	− 9·2	9 55 28·0
3	D - -	33	Aug. 24–Dec. 12	18	− 9·7	9 55 27·4
4	W - -	45	Nov. 25–Jan. 2	15	− 9·3	9 55 27·9
5	D - -	53	Nov. 25–Mar. 1	6	− 8·7	9 55 28·7
6	W - -	(124)	Aug. 11–Nov. 3	7	−11·3	9 55 25·2
7	D - -	148	Aug. 10–Jan. 12	37	− 7·5	9 55 30·4
8	W - -	(157)	July 28–Oct. 20	6	−10·0	9 55 26·9
9	D - -	290	Oct. 1–Jan. 21	5	− 7·7	9 55 30·1

Mean rotation period = $9^h\ 55^m\ 28^s{\cdot}1$.

N. EQUATORIAL SPOTS.

(S. Edge of N. Equatorial Belt and N. part of Equatorial Zone.)

No.	Character.	ω_1 at ☊.	Limiting Dates.	No. of Observations.	Change of Longitude in 30 days.	Rotation Period.		
		°			°	h	m	s
1	W - -	4	Nov. 7–Dec. 25	9	− 8·0	9	50	19·2
2	D - -	13	Sept. 19–Jan. 29	11	− 6·7	9	50	21·0
3	W - -	20	Nov. 7–Jan. 29	8	− 6·3	9	50	21·5
4	D - -	27	Aug. 14–Jan. 27	10	− 8·0	9	50	19·2
5	W - -	35	Aug. 21–Jan. 3	9	− 7·3	9	50	20·2
6	D - -	43	Sept. 1–Jan. 31	15	−10·9	9	50	15·3
7	W - -	67	Aug. 26–Jan. 31	18	− 9·7	9	50	17·0
8	D - -	75	Sept. 20–Feb. 21	24	− 6·3	9	50	21·5
9	W - -	83	Aug. 19–Dec. 25	10	− 9·0	9	50	17·9
10	D - -	102	Sept. 3–Jan. 16	12	− 7·7	9	50	19·6
11	W - -	114	Aug. 19–Jan. 29	13	− 9·2	9	50	17·6
12	D - -	128	Aug. 24–Dec. 27	17	− 9·0	9	50	17·9
13	W - -	139	Sept. 3–Jan. 7	19	− 8·3	9	50	18·8
14	D - -	(148)	Sept. 20–Nov. 27	18	−12·3	9	50	13·5
15	W - -	172	Aug. 24–Mar. 9	17	−10·7	9	50	15·6
16	D - -	185	Aug. 24–Feb. 15	17	− 7·7	9	50	19·6
17	W - -	193	Aug. 24–Feb. 15	14	− 8·0	9	50	19·2
18	D - -	211	Aug. 24–Jan. 7	12	− 6·0	9	50	21·9
19	W - -	222	Aug. 24–Dec. 11	10	− 5·3	9	50	22·9
20	D - -	237	Sept. 3–Jan. 2	8	− 6·7	9	50	21·0
21	W - -	246	Sept. 19–Jan. 2	12	− 6·7	9	50	21·0
22	D - -	259	Sept. 23–Oct. 19	21	− 9·3	9	50	17·5
23	W - -	(263)	Jan. 2–Mar. 24	7	− 7·0	9	50	20·6
24	D - -	277	Sept. 23–Dec. 27	9	−11·3	9	50	14·8
25	W - -	(286)	Sept. 19–Nov. 25	8	−11·3	9	50	14·8
26	D - -	302	Oct. 10–Jan. 3	12	− 5·7	9	50	22·3
27	W - -	315	Sept. 23–Jan. 30	10	− 3·0	9	50	26·0
28	D - -	332	Aug. 18–Jan. 31	13	− 5·8	9	50	22·2
29	W - -	340	Aug. 18–Jan. 13	20	− 5·8	9	50	22·2
30	D - -	351	Aug. 14–Jan. 13	23	− 6·3	9	50	21·5

Mean rotation period = $9^h\ 50^m\ 19^s{\cdot}4$.

S. EQUATORIAL SPOTS.

(N. Edge of S. Equatorial Belt and S. part of Equatorial Zone.)

1	D - -	73	Aug. 14–Dec. 17	7	+23·5	9	51	1·6
2	W - -	82	Aug. 14–Dec. 17	9	+23·5	9	51	1·6
3	D - -	(135)	Aug. 18–Oct. 30	12	+38·5	9	51	21·8
4	D - -	223	Sept. 20–Nov. 13	11	+ 8·0	9	50	40·8

Mean rotation period = $9^h\ 51^m\ 1^s{\cdot}4$.

DARK SPOT IN S. COMPONENT OF S. EQUATORIAL BELT.

No.	Character.	ω_2 at ☊.	Limiting Dates.	No. of Observations.	Change of Longitude in 30 days.	Rotation Period.
		°			°	h m s
I	D - -	15	Aug. 24–Dec. 19	9	− 6·7	9 55 31·5

RED SPOT AND HOLLOW.

I	*p* Shoulder	60	Aug. 12–Mar. 30	23	− 5·8	9 55 32·7
2	Centre of Hollow.	77	July 22–May 12	56	− 5·8	9 55 33·8
3	Red Spot	79	Nov. 25–Mar. 30	12	− 5·0	9 55 33·8
4	*f* Shoulder	94	July 5–May 12	42	− 4·3	9 55 34·7

Mean rotation period of Red Spot and Hollow = $9^h\ 55^m\ 33^s{\cdot}8$.

S. TROPICAL DISTURBANCE.

I	W - -	2	Aug. 24–Mar. 22	14	− 9·2	9 55 28·0
2	*p* end -	8	Aug. 24–April 27	56	−11·3	9 55 25·2
3	*f* end -	175	July 28–Mar. 26	53	− 6·7	9 55 31·5
4	W - -	179	Oct. 30–Mar. 16	4	− 6·7	9 55 31·5

Mean rotation period (*p* and *f* ends) = $9^h\ 55^m\ 28^s{\cdot}4$.

OTHER S. TROPICAL MARKINGS.

I	"Shoulder" in S. Trop. Dist.	29	Sept. 29–Jan. 28	14	− 0·3	9 55 40·2
			Jan. 29–Mar. 20	3	−16·7	9 55 17·8
2	W *p* R. Spot H.	37	Sept. 3–Mar. 22	11	− 1·8	9 55 38·2
3	W *f* R. Spot.	(90)	Dec. 2–Mar. 23	10	− 2·7	9 55 36·9
4	*p* end S. Trop. Dist. *f* R. Spot.	(94)	Dec. 2–Mar. 30	22	− 1·3	9 55 38·9

Adopted rotation period = $9^h\ 55^m\ 38^s{\cdot}0$.

S. TEMPERATE SPOTS.

I	W - -	121	Sept. 30–Jan. 12	8	−15·7	9 55 19·1
2	W - -	336	Aug. 29–Oct. 19	3	−16·0	9 55 18·7
3	*p* end of thickening S.T.B.	341	Aug. 24–Mar. 22	25	−16·2	9 55 18·5

Me n rotation period = $9^h\ 55^m\ 18^s{\cdot}8$.

S.S. TEMPERATE SPOTS.

No.	Character.	ω_2 at ☍.	Limiting Dates.	No. of Observations.	Change of Longitude in 30 days.	Rotation Period.
		°			°	h m s
1	Gap -	(7)	Sept. 30–Nov. 14	4	−26·3	9 55 4·6
2	D - -	72	Sept. 20–Jan. 29	7	−24·2	9 55 7·8
3	D - -	212	Nov. 16–Dec. 19	2	−24·0	9 55 7·8
4	W - -	(246)	Oct. 1–Nov. 4	2	−31·0	9 54 58·2
5	D - -	(250)	Sept. 19–Nov. 4	4	−29·7	9 55 0·0
6	D. on N. Component.	62	Nov. 16–Dec. 19	3	−25·3	9 55 6·0
7	W - -	(285)	Sept. 19–Nov. 7	4	−20·3	9 55 12·8
8	D - -	290	Sept. 19–Feb. 16	15	−21·7	9 55 10·9

Mean rotation period = $9^h\ 55^m\ 6^s{\cdot}0$.

SUMMARY.

Current, &c.	1917–18.		1916–17.		1915.	
	Rotation Period.	No. of Objects.	Rotation Period.	No. of Objects.	Rotation Period.	No. of Objects.
	h m s		h m s		h m s	
N. Polar Spots -	9 55 51·6	3	9 55 47·0	4	—	—
N.N.N. Temperate Spots.	9 55 29·0	2	—	—	—	—
N.N. Temperate Spots	9 55 37·1	5	9 55 43·0	4	9 55 36·2	6
N. Temperate Spots -	—	—	9 55 57·1	1	9 56 1·5	1
N. Tropical Spots -	9 55 28·1	9	9 55 30·1	21	9 55 27·5	25
N. Equatorial Spots -	9 50 19·4	30	9 50 14·2	24	9 50 14·8	23
S. Equatorial Spots -	9 51 1·4	4	9 50 26·8	2	9 50 28·7	1
Spots in S. Component S. Equatorial Belt	9 55 31·5	1	9 55 36·0	1	9 55 34·8	
Red Spot Hollow, &c.	9 55 33·8	4	9 55 36·5	3	9 55 37·5	4
S. Tropical Disturbance	9 55 28·4	2	9 55 27·9	2	9 55 29·3	2
Other S. Tropical Markings	9 55 38·0	4	—	—	—	—
S. Temperate Spots -	9 55 18·8	3	9 55 21·3	5	9 55 20·9	4
S.S. Temperate Spots	9 55 6·0	8	9 55 3·5	2	—	—

SATELLITE OBSERVATIONS.

The following observations of special interest were obtained :—

1917 September 23.—III. elongated *sp–nf*. Bright at *sp* end, dusky at *nf* end. About $2^d\ 14^h$ after superior geocentric conjunction (Ainslie).

I. near mid transit seen as a small dark round spot. Projected on S. Equatorial Belt (Phillips).

October 1.—Remarkable transit of III. Satellite. Before transit clearly elliptical with ratio of axes 5 : 4. P.A. of major axis (taking Jupiter's axis = zero) 20° (Phillips); 22° (Steavenson). Large bright cap at *sp* end. Dusky belt at right angles to major axis. Satellite appeared later to be gibbous with *p* side shaded (Phillips). After transit ingress the bright cap shone with intense brilliancy while the remainder of the disc gradually grew dark from the spreading inwards of the *np* limb shading. Near midtransit the appearance was that of a figure of eight with the south component bright and the north component very dark, the P.A. (Phillips) being 342°. Later, towards transit egress, the north component also appeared bright and the satellite looked like a close double star in contact with the south component much the larger and brighter. A rapid change in the P.A. to about 25° (Phillips) accompanied the brightening of the *nf* portion of the disc. For further details of this transit see a paper by Dr. Steavenson and the Director, who observed together at Headley, in *Journal*, Vol. XXVIII., p. 56. I. appeared slightly elliptical on emerging from occultation. Measured P.A. of major axis from Jupiter's axis = 110° (Phillips).

December 3.—Transit f. of II. seemed late. Timed $8^h\ 15^m$ as against $8^h\ 9^m\ 30^s$ in *Nautical Almanac* (Sargent).

December 7.—The albedo of II. seems slightly less than that of I., though the latter is nearer the planet. I. is strikingly elliptical. P.A. of major axis from Jupiter's axis = 91° (Phillips).

December 17.—Shadow of I. and II. on disc together. The shadow of II. is only about half as black as that of I. (Thomson).

December 19.—III. before transit much as on October 1. Bright cap at *sp* end very conspicuous, with dark band crossing centre of disc at right angles to major axis. During and for some time after egress the satellite presented a notched or inverted cottage-loaf aspect, the bright south component being the larger (Plate II., fig. 1). P.A. of major axis 13° from Jupiter's axis (Phillips).

1918 January 2.—At $9^h\ 18^m$ I. was seen projected on the white S. Tropical spot *p* the Disturbance and was shining brilliantly. III. before transit appeared elongated as on October 1. After ingress the *nf* portion disappeared, leaving a round bright spot about equal to the disc of I. This shows the bright cap to be in much the same position as on October 1, November 13, and December 19 (Phillips).

January 27.—III. approaching occultation. Seems brighter at its N. end to-night. P. A. of major axis from Jupiter's axis = 352° (Phillips).

January 31.—III. a little past inferior conjunction. Time $5^h\ 30^m$. Obviously elongated, with white area *sp* and dusky belt as on October 1, November 13, and December 19. P.A. of major axis from Jupiter's axis = 19° (Phillips).

March 23.—Transit e of II. seemed a long process. Commenced at $8^h\ 17^m$. The satellite seemed to " hang " on the limb

of the planet, and could still be seen as a projection at $8^h\ 24^m$. Possibly projection at the " phase edge " (Sargent).

March 30.—Using 5-inch, watched in strong sunlight for appearance of satellites. I. seen 62·5 minutes and III. 59·5 minutes before local sunset (Sargent).

VISIBILITY OF JUPITER TO NAKED EYE IN DAYLIGHT.

Mr. Sargent sends the following notes :—

1917 August 18.—Held the planet into daylight until 63·5 minutes after sunrise, viewing through the Observatory dome opening. Found it best to " pick it up " at short intervals rather than hold it continuously.

September 1.—Repeated naked eye seeing test, and held planet for $1^h\ 54^m$ after sunrise. The following notes were made :—

At $18^h\ 15^m$ " Very plain up to the present."
30 " Still easy."
47 " Difficult to locate."
58 " Has become easy again."
19^h 26 " First failure to locate."

Local sunrise was at $17^h\ 25^m$.

March 30.—Planet was visible to naked eye 41·5 minutes before local sunset.

NOTES ON THE DRAWINGS.

PLATE I.

Fig. 1.—*f* end of S. Tropical Disturbance on C.M. The bright gap in N. component of S. Equatorial belt and the dark spot at the *p* end of the dark streak immediately following it are the objects which exhibited the abnormally slow rotation described on p. 39.

The dark elongated spot in the N. Tropical Zone probably a survival from the previous apparition. It is No. 7 in the table on p. 42 of this Memoir, No. 17 in table on p. 89 of Vol. XXIII., Part III.

Fig.2.—The Red Spot Hollow at *p* limb. *f* end of Disturbance about half way from *f* limb towards C.M. The same dark N. Tropical spot (No. 7) as in fig. 1 on C.M. It is also shown in figs 4 and 5 and plate II., fig. 2. Several narrow belts in Southern hemisphere. Curious structure of N. Temperate belt.

Fig. 3.—The *p* end of the Disturbance coming on disc. Wavy longitudinal rift through S. Equatorial belt. Transverse rift through N. Equatorial belt. Dusky spot very far North.

Fig. 4.—Red Spot lying in its hollow. Curious detail in S. Equatorial belt. Dark N. Tropical spots near *p* and *f* limbs (Nos. 5 and 7 in table on p. 42).

Fig. 5.—Red Spot in its hollow. The white N. Tropical spot furthest from C.M. is No. 6 in the table (p. 42). The dark streak is No. 7.

Fig. 6.—Red Spot well shown. The *p* end of the Disturbance approaching *p* limb. Region of the Disturbance between the dark *p* portion and the Red Spot hollow very faint. Prominent white and dark N. Tropical spots (Nos. 4 and 5 in table on p 42)

PLATE II.

Fig. 1.—Minute white spots in S.S. Temperate belt. The *p* end of the Disturbance on C.M. Contains a small white spot like four days' old crescent moon. Short dark streak near S. edge of S Equatorial belt. Satellite III. near S. limb like a close double star with discs in contact or an inverted cottage-loaf. Satellite I. and shadow near S. edge of S. Equatorial belt. Satellite appears distinctly elongated E.–W.

Fig. 2.—Narrow belts S. of S. Temperate belt with dark spots. White spots in S. Equatorial belt. N. Tropical spot No. 7 in table on p. 42. Dark spots very far North.

Fig. 3.—Red spot hollow a little past C.M.

Fig. 4.—The *f* end of the Disturbance close to the C.M. Dark knots on N. Equatorial belt.

Fig. 5.—Red spot near C.M. with white area following it. Gap in N.N. Temperate belt.

Fig. 6.—The *p* end of the Disturbance approaching limb. Dark N. Tropical spot, No. 5 in table on p. 42.

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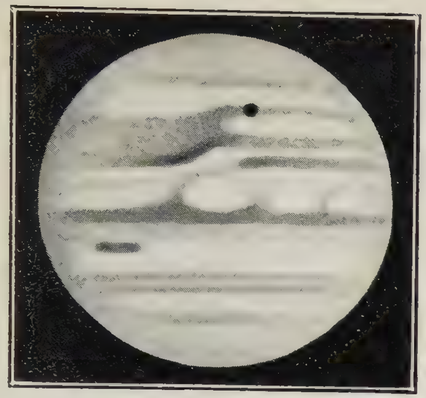

FIG. 1.—1917 Aug. 18^d 16^h 0^m
$\lambda_1 = 356°$ $\lambda_2 = 203°$
F. Sargent. 10-in. spec.

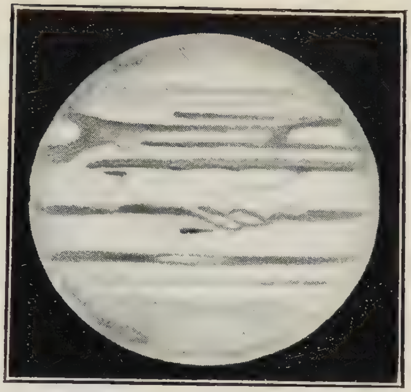

FIG. 2.—1917 Oct. 27^d 12^h 25^m
$\lambda_1 = 120°$ $\lambda_2 = 155°$
M. A. Ainslie. 9-in. spec.

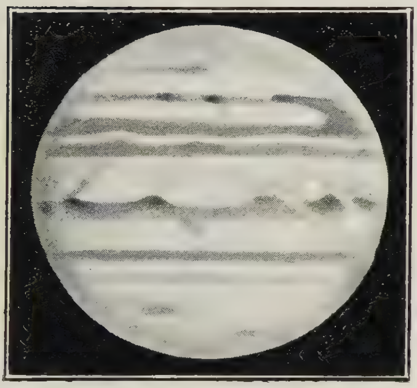

FIG. 3.—1917 Nov. 19^d 11^h 15^m
$\lambda_1 = 113°$ $\lambda_2 = 332°$
H. Thomson. 12½-in. spec.

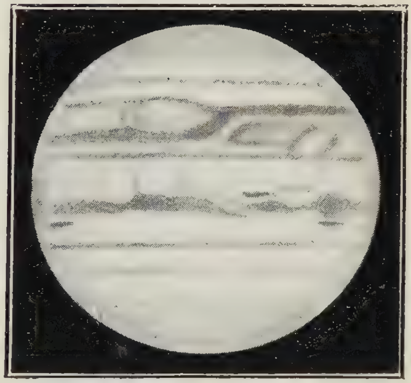

FIG. 4.—1917 Nov. 25^d 9^h 36^m
$\lambda_1 = 281°$ $\lambda_2 = 95°$
M. A. Ainslie. 9-in. spec.

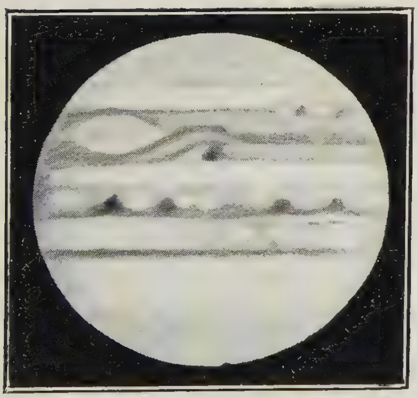

FIG. 5.—1917 Dec. 7^d 9^h 50^m
$\lambda_1 = 25°$ $\lambda_2 = 108°$
M. A. Ainslie. 9-in. spec.

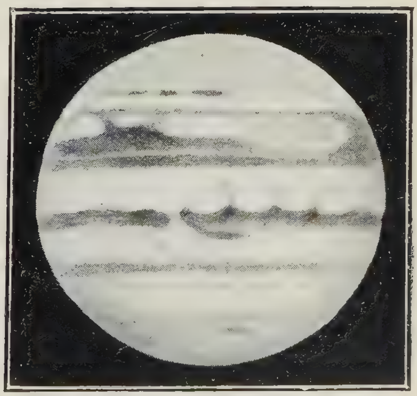

FIG. 6.—1917 Dec. 14^d 8^h 55^m
$\lambda_1 = 18°$ $\lambda_2 = 49°$
H. Thomson. 12½-in. spec.

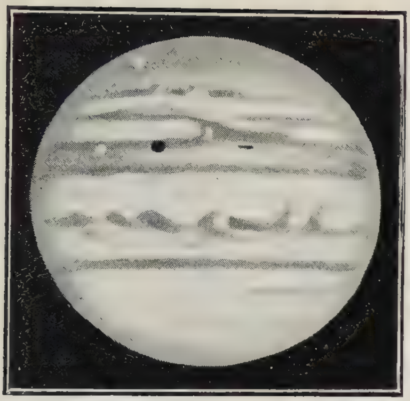

FIG. 1.—1917 Dec. $19^{d}\ 6^{h}\ 45^{m}$
$\lambda_1 = 9^{\circ}$ $\lambda_2 = 0^{\circ}$
T. E. R. Phillips. 8-in. O.G.

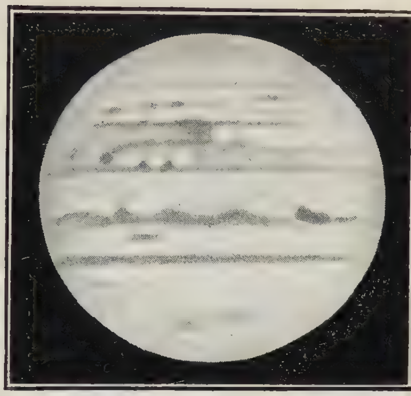

FIG. 2.—1917 Dec. $19^{d}\ 11^{h}\ 20^{m}$
$\lambda_1 = 176^{\circ}$ $\lambda_2 = 167^{\circ}$
T. E. R. Phillips. 8-in. O.G.

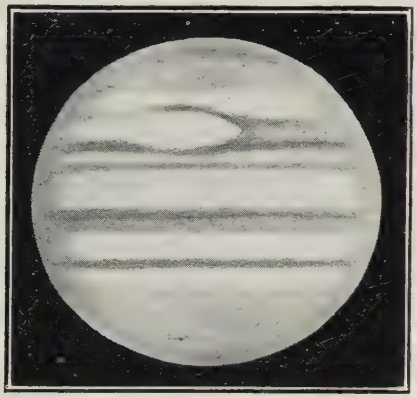

FIG. 3.—1918 Jan. $7^{d}\ 9^{h}\ 50^{m}$
$\lambda_1 = 242^{\circ}$ $\lambda_2 = 88^{\circ}$
J. H. Bridger. $8\frac{1}{2}$-in. spec.

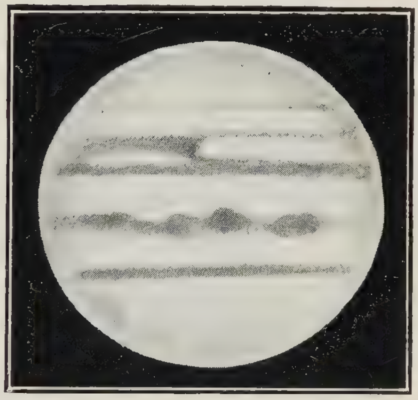

FIG. 4.—1918 Jan. $12^{d}\ 11^{h}\ 15^{m}$
$\lambda_1 = 3^{\circ}$ $\lambda_2 = 171^{\circ}$
R. L. Waterfield. 10-in. O.G.

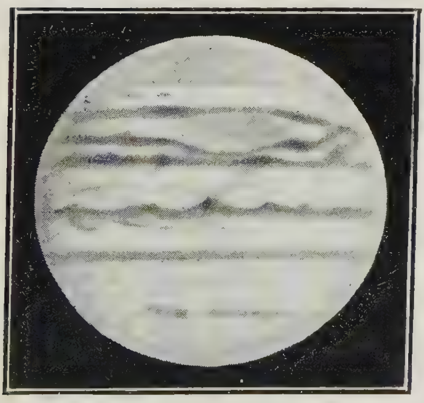

FIG. 5.—1918 Jan. $29^{d}\ 7^{h}\ 15^{m}$
$\lambda_1 = 20^{\circ}$ $\lambda_2 = 59^{\circ}$
T. E. R. Phillips. 8-in. O.G.

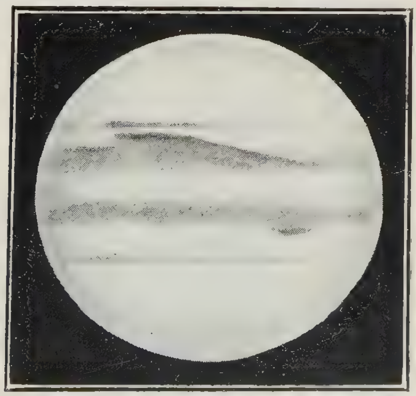

FIG. 6.—1918 March $8^{d}\ 6^{h}\ 52^{m}$
$\lambda_1 = 241^{\circ}$ $\lambda_2 = 350^{\circ}$
E. O. Berger. $4\frac{1}{4}$-in. O.G.

SECTION FOR THE OBSERVATION

OF

METEORS.

DIRECTOR.—A. GRACE COOK.

REPORT OF THE SECTION, 1922.

Introductory.

The thirteenth Memoir of the Section appeared in 1905, and contained the Report of the Section for 1904 under Mr. Walter E. Besley. After this, Interim Reports, incorporated in the current *Journals*, replaced the annual Memoirs till this year, when the work for 1922 is again published as a Memoir.

During 1922 the work was carried out mainly by a few enthusiastic Members, the rest contributing observations at irregular intervals. This is to be greatly regretted, as we need more Members to obtain duplicate paths; and, while thanking those who have contributed, the Director hopes that more effort will be made in future to send in records at the end of each month.

Mr. Denning has proved a faithful friend and encouraged the Section in every possible way. We owe him special thanks for computing most of the real paths of accordances seen by two or more observers. Mr. A. King also deserves our thanks for his share in this department. Mr. Warren, of Cape Town, has contributed further records, but, unfortunately, his health did not permit him to watch long enough to get his usual good determination of his radiants, but several confirm positions found by him in previous years. Mr. J. P. M. Prentice has achieved a record in good work throughout a rather trying year of much cloud at times. He has seized every opportunity, even cycling some distance to get above fog and town lights. His reward has come to him in the shape of many well-determined radiants, and in finding some that have not, apparently, been observed previously. He has also been of the greatest assistance in helping to prepare the Report. Owing to a move the Director was prevented from observing during September and October, just at the most interesting time of meteoric activity.

During 1922 the Northern observers sent in 4,019 meteor records, Mr. Prentice contributing 2,411 in 377 hours of watching. The Southern observers during part of 1921 and 1922 sent in 282 records, thus bringing the total used in the preparation of the Memoir up to 4,300.

The following list contains the names and places of observation of the observers who have contributed to this Memoir :—

NORTHERN HEMISPHERE.

B.	M. T. Brockman, Ealing, London.
Bn.	Basil Brown, Rickinghall Superior, Diss, Norfolk.
C.	A. G. Cook, Stowmarket, Suffolk.
Cn.	E. H. Collinson, Ipswich, Suffolk.
Cr.	R. A. Crowther, Holt, Norfolk.
D.	W. F. Denning, Bristol.
H.	W. B. Housman, Workington, Cumberland.
Hr.	W. R. Harper, Holt, Norfolk.
K.	A. King, Ashby, Scunthorpe, Lincs.
M.	S. B. Mattey, Plumstead, London.
P.	J. P. M. Prentice, Stowmarket, Suffolk.
S.	F. Sargent, Durham.
T.	W. G. Tidmarsh, Bury St. Edmunds, Suffolk; and Exeter.
Wh.	R. Whitehead, Sale, Cheshire.

SOUTHERN HEMISPHERE.

Cs.	A. Cousins, Pretoria and Rustenburg, S. Africa.
O.	O. A. Oeser, Pretoria.
W.	J. Warren, Cape Town.

Description of Memoir.

SPECIAL SHOWERS.

A description of the observations made of the great showers and of some important minor showers that seemed to justify special mention is first given. It is thought that from the tables of watches a pretty accurate idea of the richness of the showers can be obtained. No attempt has been made to assign hourly rates, the subject being so unsatisfactory and considerable discrepancies being introduced by local atmospheric conditions, altitude of radiants, region of sky watched, etc.

TABLE OF RADIANTS. (TABLE I.).

The Table of Radiants may be considered as being the most important contribution of the Section during 1922. The arrangement of the Table is sufficiently indicated by the headings of the various columns, but the following points call for attention :—

Determination of Radiants.—In the past, criticism has been directed to the practice of combining paths seen over a large interval of time to form a single radiant. Care has been taken to avoid this.

In general, a meteor has not been considered as belonging to a given radiant if its projection does not pass within 2° of the adopted point. In certain cases where this principle has not been followed the fact is mentioned in the Table under the heading "Notes." Usually, however, the paths converge within much stricter limits.

Grouping into Showers.—It will be seen that the plan of grouping radiants seen at widely different dates under the heading of the same shower has been followed. This has been sometimes objected to, on theoretical grounds, but it is justified from the point of view of convenience of reference; but, apart from this, it is believed to be, in general, consistent with the true interpretation of the observations.

Aspect.—Although there is a conflict of opinion as to the value of the aspect of the meteors, Col. 7 is included because it is thought that in several cases this has a real value, and may prove helpful to future workers.

The following abbreviations are used in the column :—

sl. = slow	v. = very
r. = rapid	f. = fairly
br. = bright	K. = streaks
ft. = faint	t. = trains

Col. 8 contains references to the number of the shower in question in Mr. Denning's General Catalogue of Radiants, *Memoirs of R.A.S.*, Vol. 53. It is thought that this will be useful for ready reference to past records.

Col. 9.—All the radiants in this Memoir (except the Southern ones, Table III.) are corrected for Zenithal Attraction where the correction amounts approximately to 2°. It seems very necessary that this should be done, and it is suggested that in all future Tables of Radiants the correction, where substantial, should be applied. Where it has been so applied, the fact is indicated by a "z" in Col. 9.

TABLE OF SOUTHERN RADIANTS. (TABLE III.)

It is very gratifying to have observations coming in from the Southern hemisphere, and the radiants deduced are particularly interesting and valuable on account of our meagre knowledge of the Southern showers.

INDEX OF RADIANTS IN ORDER OF R.A.

It will be observed that the Table of Radiants is arranged in order of date. This Index of Radiants in order of R.A. is included for purposes of reference, and will be useful to anybody following up the records of a particular shower from year to year.

TABLE OF TRUE PATHS. (TABLE II.)

Table II. of the list of True Paths consists of the real paths of fireballs and meteors observed at two or more stations. It will be noticed that in some cases the observations have been made by persons not regular observers, and there is a presumption that these accordances are not so accurate as the others.

As to the accuracy of accordances in general, it must be confessed that they are not at all satisfactory. This is necessarily so in view of the difficult nature of the observations and of the difference in weather conditions prevailing in the various localities.

In general, the radiants derived from accordances, though not so accurate as those derived from several paths, are reasonably satisfactory; and have, therefore, also been included in the Table of Radiants. In certain cases, however, this has not been done, where the radiant derived was considered in any way uncertain.

Some attempt has been made in the Table to indicate the relative value of the accordances, but it is hoped to introduce a more rigid method in future Memoirs.

LIST OF FIREBALLS.

A large number of fireballs was recorded during 1922, but only those of special interest are here mentioned. These reports of fireballs are always fascinating, and may have some value.

Stationary Radiation.

The subject has been discussed recently in *M.N.* and *The Observatory*, with special reference to the ϵ Arietid and Orionid showers. With regard to the ϵ Arietids, the observational evidence for long duration appears to be very strong, but the mathematical difficulties seem still to be insurmountable. In *M.N.* for December, 1922, Dr. C. P. Olivier has a paper on the ϵ Arietids in reply to a previous paper on this subject in the March, 1922, *M.N.*, by P. and C., in which he shows, amongst other things, that the inclination changes from retrograde to direct during the period of observation, and that in October (when it should be noted that the shower is probably at its strongest) $q = 0$, *i.e.*, perihelion lies within the Sun itself.

With regard to the Orionids, Dr. Olivier has found a moving radiant (*The Observatory*, January, 1923), but that is not in agreement with the results of the English observers. For the present the matter must be left at that. In this Memoir the shower is treated as being stationary, this being indicated by the observations.

In a single year's work it is naturally impossible to obtain evidence as to the long enduring character of meteor showers. At the same time, the number of cases in which a shower has been observed from the same apparent point at different periods of the year is distinctly curious. Attention may be called to

the following in particular :—ξ Ursids; β Comids; α Cepheids; α Camelids; β Triangulids and α Aurigids, though there are several others. Again, several showers have been seen from the same apparent point throughout a month or two, notably α Capricornids (July); θ Cygnids (August); γ Delphinids (August), and α Arietids (October). These showers were recorded in the ordinary course of observation; they were not specially looked for; yet they offer further evidence in favour of the existence of stationary radiation.

Record of Particular Showers.

Quadrantids.

The shower commenced early, as a Quadrantid was seen by S. at Durham Observatory and C. at Stowmarket, on 1921 December 20, at $10^h\ 36^m$. The real path was computed by Mr. Denning, and the radiant found at $229° + 60°$. Two probable Quadrantids were observed by D. on December 23, one of them being very bright. On January 2, after midnight, C. recorded eight Quadrantids in $4\frac{3}{4}$ hrs. S., watching from 15^h to 18^h, recorded 25 meteors, 20 of them belonging to the shower. On January 3, between $5^h\ 40^m$ and $6^h\ 50^m$, D. at Bristol found the hourly rate to be 30 for one observer. After 9^h the h.r. declined to 12. Miss Myres, at Oxford, watching in the early evening of the 3rd, recorded the paths of many bright meteors, several of them being Quadrantids. The results of the other observers are given in the table of the progress of the shower, and the radiant points in the List of Radiants.

The progress of the Shower on January 2 and 3, set out in tabular form :—

Date.	Limits of Watches.	Duration of Watches.	Meteors recorded.	Quadrantids recorded.	Observer.
	h m	h			
Jan. 2 -	10·25–11·25	1· 0	4	1	C.
,, -	11·45–15·30	3·45	22	7	C.
,, -	15· 0–18· 0	3· 0	25	20	S.
3 -	5·40– 6·50	1·10	34	34	D.
,, -	8·30–12·45	4·45	21	18	C.
,, -	9· 0–10·45	1·45	6	3	Cn.
,, -	10·30–13·15	2·45	13	4	M.
,, -	10·40–13· 0	2·20	21	17	K.

Lyrids.

This shower was observed in good weather. The maximum probably occurred on April 21 about $10^h\ 45^m$. Some very fine Lyrids were observed, but the observers were not well placed

for accordances, and several members were absent altogether, which spoilt the chance for many duplicate paths.

The radiant was found as follows, the results clearly confirming a moving radiant. :—

Date.	Radiant.	Observers.
	° °	
April 17 - - - -	266+32	C.
19 - - - -	268+33	C.
20 - - - -	270+33	C. P.
21 - - - -	271+33	C., Cn., P.

The first Lyrids were seen on April 17, and the last on April 22. Details of the observations are given as follows :—

Date.	Limits of Watches.	Duration of Watches.	Meteors seen.	Lyrids seen.	Lyrids recorded.	Observer.	Sky.
	h m h m	h m					
April 17 -	8·20–11· 5	2·45	6	—	—	P.	Clear.
,, -	8·30–11·15	2·45	5	2	2	C.	
19 -	8·30–12·15	3·45	13	2	2	C.	Clear.
,, -	8·20–12·20	4· 0	12	—	—	P.	
20 -	8·40–14·40	6· 0	37	3	3	P.	V. clear.
,, -	8·30–13·30	5· 0	18	8	8	C.	
,, -	9·45–11·45	2· 0	6	4	3	H.	
21 -	8·45–13· 0	4·15	41	28	21	C.	Clear, a
,, -	8·45–14·15	5·30	71	17	17	P.	little
,, -	8·30–12·15	3·45	19	9	9	Cn.	passing
22 -	10· 0–12·45	2·45	8	1	1	H.	cloud.

AQUARIDS.

This shower was looked for by P. and C., but in spite of a good sky hardly any Aquarids were seen. The table shows the results of the watches :—

Date.	Limits of Watches.	Duration of Watches.	Meteors seen.	Aquarids seen.	Aquarids. recorded.	Observer.	Sky.
	h m h m	h m					
May 2 -	12·45–14·30	1·45	4	—	—	P.	Clear.
3 -	11·45–13·45	2· 0	6	—	—	P.	,,
4 -	12·30–15·15	2·45	7	2	2	C.	,,
,, -	12·45–15· 0	2·15	14	2	2	P.	,,

PONS-WINNECKE.

Despite careful watches, under somewhat unsatisfactory weather conditions, nothing was seen of this shower: either of the rich shower of Draconids at 228° + 68° and 246° + 64° which were seen in 1921, and which are probably connected with Pons-Winnecke's comet, or of the moving radiant deduced by the Japanese observers from a number of faint meteors seen by them in 1921.

Date.	Limits of Watches.	Duration of Watches.	Meteors recorded.	Pons-Winnecke recorded.	Observer.	Sky.
	h m h m	h m				
June 24 -	10·50–11·30	0·40	2	0	C.	Clouding up.
25 -	10·10–13·10	3· 0	9	0	P.	Good.
,, -	12·10–13·45	1·35	4	0	C.	
27 -	10· 0–12·30	2·30	4	0	P.	Observed between gaps in clouds.
,, -	10·30–11·40	1·10	1	0	C.	
28 -	10· 0–11·30	1·30	4	0	T.	
,, -	11·45–13·30	1·45	8	0	P.	Cloud, becoming clearer by 12·45^m.
,, -	12· 0–14· 0	2· 0	6	0	C.	
29 -	10· 0–11·45	1·45	2	0	C.	Cloud, clear after 11^h.
,, -	10·20–13·20	3· 0	16	0	P.	

α CAPRICORNIDS.

Meteors were seen from this shower during the latter half of July, and the shower was of a richness sufficient to justify special mention. The meteors averaged 1st magnitude, and were pretty uniform in brightness. The apparent motion was decidedly slow; and the length of apparent path above the average. The shower was well seen in 1915, and is generally in evidence. It is probably connected with Denning's comet, 1881 V. (*See Observatory*, July, 1920.)

This year the radiant has been carefully investigated, the correction for zenithal attraction being applied to each individual path. The curious and striking feature arising from this is that two centres are involved, at 304°–11° and 310°–11°, both being active simultaneously. The meteors from these two centres were mutually indistinguishable, and it is reasonable to suppose that there is some physical connection between them, as appears to be the case with the Orionids, Quadrantids, etc.

The evidence for the existence of these centres is as follows :—

Date.	I.—Mean position 304°–11°.			II.—Mean position 310°–11°.		
	Radiant.	No. of ψ s.	Observer.	Radiant.	No. of ψ s.	Observer.
July 18 -	305°–12°	3	T.	—	—	—
19 -	—	—	—	309°–12°	5	P.
21 -	}304–10	4	P.	—	—	—
25 -				}310–11	4	P., C.
28 -	304–12	6	P.			
30 -	305–12	4	P.	310–11	5	P.
31 -	—	—	—	310–11	3	C.

The double radiant of this shower does not appear to have been expressly realised previously, though Mr. Denning has mentioned the difficulty of determining a satisfactory radiant point. Some observations of the past, however, do confirm the double character of the shower; among them is to be noted the following, taken from the Report of the American Meteor Society, 1914–1918 (Leander McCormick, Vol. II., Part 7) :—

Date.	I.	II.
1916^y 7^m 21—24^d - -	300°–8° (No. 1078)	310°–9° (No. 1095)
29^d - -	300–7 (No. 1076)	310–16 (No. 1093)

PERSEIDS.

A number of the Members observed this shower. It did not appear to be at all rich. The scarcity of Perseids during July was noteworthy, and, despite long watches from the 17th onwards, none were seen for certain till the 29th. Moonlight interfered with the observation of maximum, but it was evident that the shower was not nearly so active as in 1921. The later stages of the display were well seen, the shower being curiously plentiful considering the scarcity in July and weakness at maximum.

P.'s Perseid radiants are as follows :—

Date.	Radiant.	No. ψ s used.	Notes.
July 30 - -	33°+52°	6	
31 - -	34+54	6	Diffuse.
Aug. 1 - -	35+54	4	Diffuse.
15 - -	52+58	4	
16 - -	53+58	3	
17 - -	55+59½	4	
18 - -	56+60	1	Declination assumed.
20 - -	57+61	4	

The following table shows the results of the watches :—

Date.	Limits of Watches.	Duration of Watches.	No. of ψ s.	No. of Perseids	Ob-server.	Sky.
	h m h m	h m				
July 29	10· 0–12· 0	2· 0	6	3	B.	
30	9·40–14·10	4·30	73	6	P.	
,,	11·45–14· 0	2·15	26	3	K.	V. fine.
31	9·30–14· 0	4·30	49	9	P.	V. fine.
,,	9·40–14·15	4·35	39	8	C.	
,,	10· 0–13·30	3·30	20	2	K.	
Aug. 1	10·30–11·45	1·15	9	2	C.	Good.
,,	13· 0–14·15	1·15	19	2	P.	
2	11·20–13· 5	1·45	20	7	K.	Good.
5	10·10–11·10	1· 0	2	2	C.	
7	9·15–11·45	2·30	1	1	C.	
,,	9·50–11·20	1·30	5	1	B.	
8	9·45–11· 0	1·15	4	2	B.	Good.
,,	12·40–14·10	1·30	8	5	P.	
11	9·30–12· 0	2·30	6	4	H.	Moonlight.
,,	10· 0–13· 0	3· 0	16	6	Wh.	
,,	11·15–13·30	2·15	21	14	K.	Sky poor.
,,	13·50–14·50	1· 0	9	1	T.	V. fine.
,,	14·50–15·25	·35	9	7	P.	V. clear.
12	11·30–12·45	1·15	12	6	K.	
15	9·15–11·30	2·15	16	4	C.	V. clear.
,,	9·30–10·15	·45	12	6	D.	
,,	9·30–12· 0	2·30	10	2	B.	
,,	9·40–12·55	3·15	32	6	P.	
,,	9·45–11·15	1·30	11	1	T.	
,,	9·50–12·50	3· 0	17	5	K.	
16	9· 5–11·50	2·45	29	5	P.	
,,	9·15–11·45	2·30	17	0	C.	
,,	9·30–10·30	1· 0	13	3	T.	
17	8·30–10· 0	1·30	10	0	T.	
,,	8·50–13·50	5· 0	63	5	P.	
,,	9· 0–13· 0	4· 0	36	1	C.	
,,	9·45–12·15	2·30	28	6	K.	
18	10·30–13·30	3· 0	32	1	P.	
19	8·50–11· 5	2·15	22	0	P.	
,,	9·15–11·30	2·15	17	0	C.	
20	8·45–15·15	6·30	83	7	P.	
,,	9·15–13· 0	3·45	27	0	C.	

CEPHEID MOVING RADIANT.

From August 15–25 fairly extensive watching was possible at Stowmarket, and many meteors were recorded; amongst these were several swift and rather faint meteors, but no radiant from them was noticed at the time. A casual plotting, however, soon suggested a radiant near 330° + 80°; and a more careful survey, undertaken later, gave very distinct evidence of a moving radiant, based on 22 paths from August 16–24.

Watch on these nights was kept by P. as follows :—

Date.	Limit of Watches.	Duration of Watch.	No. ψs.	No. Cepheids.
	h m h m	h m		
Aug. 16 - -	9· 5–11·50	2·45	31	4
17 - -	8·50–13·50	5· 0	63	6
18 - -	10·30–13·30	3· 0	32	1
19 - -	8·50–11· 5	2·15	20	1
20 - -	8·45–15·15	6·30	83	4
23 - -	8·35–14·35	6· 0	62	4
24 - -	9·50–11·50	2· 0	21	2

Owing to cloudy weather, watch was possible for only a short time on 19th and 24th, and was totally impossible on 21st and 22nd.

The positions determined for the Radiant were as follows :—

Date.	Radiant position.	No. ψs.	No. ψs. giving R.A.	Notes.
Aug. 16, 17 -	325°+80°	10	3	
18 -	332+80	1	1	Dec. assumed.
20 -	344+79½	4	2	
23, 24 -	360+80	6	3	

There is no shower from this position mentioned in the G.C.; the only previous determination so far as we know is : 1902 August 26–September 7. Radiant = 337° + 82°. 10 ψs. Observer : W. F. D.

It will be seen that this is not in good agreement with the above positions. The Rev. M. Davidson has kindly worked out orbits of the streams based on these positions, as follow :—

Date.	Radiant.	ι	π	Ω	q	Velocity. Miles per second.
Aug. 18 -	332°+80°	68·8	319	145	1·009	27
Sept. 7 -	337+82	71·3	351·2	165	1·006	27

No cometary orbit has been identified with these elements. If this is a moving radiant, the discovery must be considered rather a novelty. Motion of a shower's radiant is only known with certainty for the Perseids, Lyrids and Geminids. It has been suspected in a few other cases, but we must consider this inability to prove moving radiants as one of the outstanding

features of meteoric astronomy. That the inability to do so is due to inaccurate observations, the Director does not believe for one moment; there is too much evidence to the contrary.

θ CYGNIDS.

The shower was seen from about August 15–25, and was remarkable for the brilliance of many of its meteors. The largest fireballs were of magnitude = ♃, and after moving over a short path of some 5°, they exploded into great flashes almost equal to the full moon in intensity. They moved with comparative slowness, the flashes at the end were sudden and startling, and there was a reddish-brown streak left along their short courses. The normal colour of the meteors was bluish-white.

Exceptional displays of this shower were recorded in the following years:—

Year.	Date.	Radiant.	No. ♈s.	Observer.
	Aug.	° °		
1893 - -	4–16	292+53	28	Denning.
,, - -	4–18	292+51	40	Corder.
,, - -	8–19	290+50½	30	Blakeley
,, - -	14–16	293+53	12	Booth.
1901 - -	8–10	290+50	10	Townshend.
,, - -	10–12	290+53	10	Denning.

In 1914 the radiant was found at 292° + 53°, based on reductions from the paths of Mrs. F. Wilson, Rev. J. M. F. Dumphreys, C. L. Brook and C. The shower was a fairly rich one that year.

Year.	Date.	Radiant.	No. ♈s.	Observer.
1922	Aug. 15–20 -	291°+52°	20	P.
,,	,, 15–26 -	291½+50	18	C.

Mr. Denning considers that it may have a short period of about 7½ years.

In *B.A.A. Journal*, Vol. XXV., p. 125, Interim Report No. 26, the Rev. M. Davidson, Director, published the elements of the orbits of the θ Cygnids at 292° + 53° and the α Lyrids at 280° + 44°, which shower is seen together with that at 292° + 53°. He remarks "that it is not clear there is any connection between the two showers, though their elements do not differ very much."

The elements are as follows :—

Radiant.	ι	π	Ω	q
292°+53°	44	345	140	·953
280+44	32	326	144	1·000

The α Lyrid shower is rather remarkable. The aspect of its bright meteors is similar to that of the θ Cygnids, in that they explode, and explosive meteors of this description are uncommon. The accordances in 1914 showed a great discordance in velocity. One on August 12 appeared to move with a velocity of 80 miles per second. Another on August 16 had a velocity of only 16 miles per second. The parabolic velocity corresponding to the radiant at that time was 16 miles per second.

ϵ Arietids.

This shower is of great importance because of the observations made in 1921 by Members of the Section which tend to show its long enduring character. An account of this was given in *Monthly Notices R.A.S.* for March, 1922, p. 309.

The following positions were obtained in 1922; confirming the work of the previous year :—

Date.	Radiant.	No ✝s.	Observer.
July 20–21 - - -	43+21½	8	P.
25–28 - - -	43+21½	6	P.
30–Aug. 1 - -	43+21½	11	P.
25–31 - - -	43+22	6	C.
Aug. 15 - - -	42+22	T. P.	B. K. P. T.
18–20 - - -	43+22	8	P.
20 - - -	42+21	T. P.	D. C.
,, - - -	43+21	4	C.
23–27 - - -	42+21	10	P.
Sept. 20 - - -	43+22	4	P.
26–29 - - -	43+22	10	P.
Oct. 14, 15 - - -	43+22	11	P.
18, 20 - - -	42+21	8	P.
21 - - -	43+20	3	H.
23 - - -	43+21	7	D.
24 - - -	41+19½	5	P.
Nov. 15 - - -	41+19	4	C.
13, 15, 18 - -	41+19	10	P.
26 - - -	40+20	4	P.

The correction for zenithal attractions has been applied where it exceeds 0°·6. The 1921 observations show the shower

strongly active in November, and possibly also in December. The failure to confirm this (in 1922) is attributable to bad weather.

ORIONIDS.

Very successful observations of this shower were carried out in England and America. The shower appeared to be richer than usual, as will be seen from the Table of Watches. Maximum on October 21 was well seen in America, the hourly rate being over 60.

Date.	Limits of Watches.	Duration of Watches.	No. ψs recorded.	Orionids seen.		Orionids recorded.		Observer.	Sky.
				I.	II.	I.	II.		
Oct.	h m h m	h m							
14	6·30–12·30	6· 0	45	—	2	—	2	P.	Magnificent.
15	7· 0–14· 0	7· 0	62	2	3	2	3	P.	Magnificent.
18	11· 0–16· 0	5· 0	56	8	4	8	4	P.	Fair, passing cloud.
,,	10·24–12· 0	·37	4	—	—	—	—	K.	Between clouds.
20	13·59–14·54	·55	7	4	—	4	—	K.	Between clouds.
,,	11·30–15·15	3·45	83	21	12	16	8	P.	Fair, clouded up.
21	10·45–12·55	2·10	14	14		6	—	H.	Clear.
,,	12·48–14· 7	·39	5	3	—	3	—	K.	V. cloudy; clear at times.
23	11· 0–13· 0	2· 0	18	—	5	—	5	D.	Magnificent.
,,	12·33–15· 7	1·47	11	—	4	—	4	K.	Clear at times.
24	9·15–14·15	5· 0	58	5	9	5	8	P.	Good.
25	6·30–12·20	5·50	24	5	1	5	1	P.	Clear, misty.

I. = Radiant at $91^\circ + 16^\circ$, and II. = Radiant at $99^\circ + 13^\circ$.

The stationary radiation controversy still centres about this shower. In *The Observatory*, No. 584, January 1923, Dr. C. P. Olivier has published an article on his observations during the October 1922 epoch. From these observations he deduces "strong evidence" of a moving radiant. In the February *Observatory* appear three letters from Mr. W. F. Denning, F.R.A.S., Mr. J. P. M. Prentice, and the Director, who contend that, from direct observational evidence from their own experience and those of other reliable observers extending over many years, this shift has not been detected. They contend that the shower is stationary from two centres at $91^\circ + 16^\circ$ and $99^\circ + 13^\circ$.

It also seems quite possible that a radiant seen by K. and P. at $103\frac{1}{2}^\circ + 18\frac{1}{2}^\circ$ (*see* List of Radiants, No. 123) may be a minor branch of the Orionids.

Date.	Orionid Radiant.		No. of ✦s.		Observer.
	I.	II.	I.	II.	
	° °	° °			
Oct. 14–15 -	—	98 +14	—	5	P.
15–16 -	91 +16	—	3	—	P.
18 -	91½+15½	99 +13	8	4	P.
20 -	91½+15½	98½+13½	20	13	P.
20–21 -	91 +16	—	7	—	K.
21 -	91 +16	—	6	—	H.
23 -	91 +16	—	5	—	D.
„ -	—	99 +14	—	4	K.
23–25 -	91 +16	—	11	—	P.
24 -	—	99 +13	—	7	P

LEONIDS.

This shower was observed under unsatisfactory weather conditions, but appeared to be very feeble.

Date.	Limits of Watches.	No. of Hours.	No. of ✦s.	Leonids.	Observer.
	h m h m				
Nov. 13 -	10·45–14·15	3½	16	3	P.
15 -	6·10–12·55	6¾	42	2	P.
18 -	9·50–15·20	5½	42	7	P.
„ -	8·30–10·30	2	19	3	C.
„ -	11·45–14· 0	2¼			

Some slight indication of a moving radiant was obtained by P. C.'s position on November 18 was at 152° + 20°, but was obtained from three observations only, two of these moving in Declination :—

Date.	Radiant.	No. of Leonids used.	Observer.
	° °		
Nov. 13 - -	148 +20	3	P.
15 - -	150 +20	2	P.
18 - -	153½+20	5	P.
„ - -	152 +20	3	C.

GEMINIDS.

Weather spoilt the chance of observing this return. The only watch kept was by the Director, as follows:—

Date.	G.M.T.	No. of Hours.	No. of ✦s.	No. of Geminids.
	h h m			
Dec. 13 -	11–12·45	1¾	15	11

The Geminids appeared to be fairly plentiful; seven were counted besides those recorded. After 13^h the sky was cloudy. The radiant was found at 113½° + 31½°, with a very precise centre.

Table I.—List of Radiants.

Ref. No.	Date.	Radiant.	Name of Shower.	No. of ↓s.	Observer.	Aspect.	No. in G.C.	Z.A.	Notes.
1	Jan. 2	234+53	Quadrantids	25	S.		173		Plentiful shower. Maximum in early evening of Jan. 3. Practically entirely from 231°+53°; apparently the centre at 231°+60° was not active. *See* p. 53.
,,	,, 2, 3	231+53	,,	27	C.				
,,	,, 3	232+51	,,	17	K.				
,,	,, 3	230+53	,,	34	D.				
,,	,, 3	230+52	,,	4	M.				
,,	,, 3	231+53	,,	3	Cn.				
,,	,, 3	232+53	,,	T. P.	D. My.				
,,	,, 3	238+50	,,	T. P.	D. K.				
2	,, 2, 3	90+15	ν Orionids	6	C.		75		From the same centre as the Great Orionid shower of October. Well seen 1921 Dec. 22, 23, 9 ↓s. P. R. 105
3	,, 2, 3	213+47	—	7	C.	Similar to Quadrantids.	—		First seen 1921 Dec. 25–31. [illegible] + 47½. 11↓s. P.
,,	,, 3	210+43	—	T. P.	C. K.				
4	,, 3	254+37	π Herculids	T. P.	C. My.		195		
5	,, 3	291½+52½	θ Cygnids	T. P.	D. My.		229		R. 74.
6	,, 3	335+58	δ Cepheids	T. P.	E. My.		264		
7	Feb. 7	60−11	γ Eridanids	T. P.	D. &c.		51		
8	,, 17	119+11	ζ Cancrids	T. P.	K. P. &c.		95		
9	,, 19	145+27	μ Leonids	4	P.		108		
,,	,, 20	143+26	,,	4	C.				

TABLE I.—LIST OF RADIANTS—*continued.*

Ref. No.	Date.	Radiant.	Name of Shower.	No. of ↓s.	Observer.	Aspect.	No. in G.C.	Z.A.	Notes.
10	Feb. 19, 24, 25	177+12	β Leonids	11	C.	Br. r.	134		The most conspicuous shower in Feb., 1922. Well known in spring and autumn.
,,	,, 24, 26	176+12	,,	5	P.				
11	,, 19–26	190+21½	(35) Com. Ber.	5	P.	Short	144		A spring shower, not often observed.
,,	,, 19–25	190+21½	,,	9	C.				
12	,, 19–26	197− 7	θ Virginids	7	P.	Sl.	147		Clearly indicated, determination not very satisfactory.
13	,, 20	131+19	δ Cancrids	6	P. C.		100	z	
14	,, 20	92+ 1	α Orionids	4	P.		70	z	Unsatisfactory.
15	,, 26	318+63	α Cepheids	4	P.		266		An early determination of this apparently long enduring shower. *Cf.* R. 34, 46, 79.
16	Mar. 20, 21	200+10	o Virginids	7	P.		154		
,,	,, 20, 22	197+11	,,	5	C.	F. sl.			
17	,, 21	171+33	ξ Ursids	4	P.		135		Position somewhat discordant. *Cf.* R. 26, 142, 146.
18	,, 23	216+31	ρ Boötids	6	P.		167		Well known and sharply defined Spring shower. Very active in 1921 Mar. 31, April 1. 14 ↓s. P.
19	,, 23	288+38	θ Lyrids	5	P.		Not in G.C.		Not in G.C. and apparently new. There are many G.C. radiants near; Nos. 216, 219, 222, 223, and 228. Needs reobserving.
20	Apr. 1	233+30	α Coronids	4	P.	Ft. small	175		Lies very near θ Coronids. G.C. 176. The best determinations give Decl. + 27°. R. 29.
21	,, 1	236−19	λ Librids	4	P.	Ft. small	Not in G.C.		The shower found by P. in 1921. Rather doubtful determination this year. The meteors being very small, one or two may be illusory. R. 45.
22	,, 1	270+51	γ Draconids	6	P.	Streakless	208		
23	,, 2	193+31	β Comids	4	P.	Short	152		Very rich in 1921. Mar. 31–Apr. 2. 15 ↓s. P. Feeble this year, but conditions not very favourable; *cf.* R. 40.
24	,, 4	210+50	θ Boötids	4	P.	V. sl. br.	164		

25	,, 4	289+41	δ Cygnids	5	P.	R.	228		
26	,, 19–21	166+31	ξ Ursids	7	P.	V. sl.	125	z	Has been well seen in Nov., Dec., Mar. and May, and deserves further study. *Cf.* R. 17, 142, 146.
27	,, 19–21	230– 6	β Librids	6	C.	Sl.	171		Very well known at the Lyrid epoch.
28	,, 20, 21	217– 7	μ Virginids	5	P.	V. sl. v. br. t.	166	z	Fireballs.
29	,, 20, 21	233+27	α Coronids	10	P.	Ft. r.	175		Plentiful for a minor shower. R. 20.
30	,, 20, 21	251+31	ζ Herculids	5	C.	Ft. r.	—		
31	,, 20, 21	269+22	(97) Herculids	7	P.		205		
32	,, 20, 21	271+ 7	(70) Ophiuchids	6	P.		212		
33	,, 19–21	271+33	Lyrids	32	C.		209		Not a particularly rich display, but well observed. Maximum probably occurred about 21^{d} 10^{h} 45^{m} G.M.T.
,,	,, 20, 21	270+33	,,	20+	P.	R. br. k.			
,,	,, 20	271+33	,,	3	H.				
,,	,, 21	271+33	,,	9	Cn				
,,	,, 21	271+32	,,	T. P.	C. Cn. P.				
34	,, 20, 21	308+62	α Cepheids	7	P.		246		*See* R. 15, 46, and 79.
35	,, 21	142+37	(38) Lyncids	4	P.	Sl.	107	z	An Autumn shower, hitherto unknown in April.
36	,, 21	181–21	ε Corvids	6	P.	V. sl.		z	Conspicuous shower, apparently new.
37	,, 27	192+38	α Can. Ven.	4	P.		150		Decl. 4° lower than in G.C.
38	,, 27	210–13	α Virginids	7	P.	Sl.	158	z	Well known in April. Tolerably rich display.
39	May 17, 21	248–25	α Scorpiids	5	P.	V. sl.	190	z	Well known fireball radiant at this season and in June.
40	,, 19, 21	192+27	β Comids	5	P.		162	z	R. 23. Hitherto unknown in May.
41	,, 19, 21	230+33	θ Coronids	5	P.		176		
,,	,, 23	232+33	,,	T. P.	B. P.				
42	,, 19, 21	230+16	β Serpentids	5	P.		172		Apparently hitherto confined to April.

TABLE I.—LIST OF RADIANTS—*continued.*

Ref. No.	Date.	Radiant.	Name of Shower.	No. of ↓s.	Observer.	Aspect.	No. in G.C.	Z.A.	Notes.
43	May 23 -	45+45	α-β Perseids -	T. P.	B. P.		43		R. 68, 119.
44	„ 23 -	208+44	η Ursids -	4	P.		159		
45	June 12 -	237−20	λ Librids - -	T. P.	P. T.		—		R. 21.
46	„ 28 -	316+62	α Cepheids -	2	C.		246		Sometimes a conspicuous display at the end of June, but rather feeble this year. Possibly connected with ☄ 1850 I. (*Observatory*, March, 1922). *See* R. 15, 34, 79.
„	„ 29 -	310+62	„ -	4	P.				
47	„ 29 -	12+37	μ Andromedids-	4	P.	R. - -	10		
48	July 17–21 -	9+56	α Cassiopeids -	12	P.		7		Well known in July and August. R. 97.
49	„ 18 -	311+15	γ Delphinids -	4	K.	Short - -	243		Well seen in July by Denning, '87, Bartfay '86, and Sawyer '80. R. 83.
50	„ 18–20 -	4+39	π Andromedids-	4	K.		6		
„	„ 18–20 -	4+38	„ -	5	P.				
„	„ 19 -	6+37	„ -	3	C.				
51	„ 18, 19, 25	22+30	α Triangulids -	6	K.	Br. r. k. green-headed.	20		R. 124.
52	„ 19, 20 -	296+29	—	6	C.	R. - -	—		Uncertain determination.
53	„ 19 -	341+17	α Pegasids -	5	C.		267		
„	„ 20 -	340+17	„ -	4	P.				
54	„ 20, 21 -	23+45	γ Andromedids -	6	P.		21		
„	„ 31 -	23+45	„ -	T. P.	K. T.				
55	„ 20, 21, 25, 28, 30, 31–Aug. 1	43+21½	ϵ Arietids -	25	P.	R. k. - -	37		Very conspicuous display. R. 90, 104, 118, 133.

56	,,	21 -	224+43	β Boötids -	4	P.	Sl. - -	170	z	New to July
57	,,	18 -	304−11	α Capricornids -	3	T.		237	z	Very rich display; probably connected with Denning's ☄ 1881 V. R. 93. *See* p. 55.
,,	,,	18–21, 25, 28–31	310−11	,, -	27	P.	V. sl., many large meteors.			
,,	,,	28, 31 -	310−11	,, -	7	C.				
58	,,	20, 21 -	356+63	β Cassiopeids -	6	P.		278		G.C. gives Decl. + 60°, all recent determinations + 57°. R. 113.
59	,,	21 -	290+25	β Cygnids -	4+	P.	Small - -	222		A little known shower; well seen by D. in 1901 July 19–24, 290°+24°. R. 78.
60	,,	25, 30, 31	288− 8	κ Aquilids? -	14	P.	Sl. - -	226?	z	A conspicuous display of slow meteors, well observed, but identification with G.C. 226 rather doubtful.
61	,,	25–31 -	338−12	δ Aquarids -	13	C.	V. sl. - -	263		Always visible at end of July and formerly a big shower, but has greatly declined in activity during the last 30 years.
,,	,,	30, 31 -	340−16	,, -	4	K.	Br. t. - -			
,,	,,	30–Aug. 1	341−15	,, -	12	P.				R. 87.
62	,,	28 -	277+71	ω Draconids II.	4	P.	Short - -	213		R. 85.
63	,,	28 -	328+36	π Pegasids -	4	C.		253		
64	,,	30, 31 -	328−15½	ι Aquarids -	7	P.	Sl. - -	252		Definite, well known in July.
,,	,,	31 -	327−15	,, -	4	C.				
65	,,	30 -	342+42	o Andromedids -	8	K.	Small r. - -	266		
,,	,,	30–Aug. 1	342+42	,, -	7	P.				
66	,,	30, 31 -	241+63	η Draconids -	5	P.	Sl. - -	180		
67	,,	28 -	35+44	θ Perseids -	T. P.	K. P.		30		
,,	,,	30 -	36+46	,, - -	4	P.				
68	,,	19 -	47+43	α–β Perseids -	T. P.	K. P.		43		
,,		30, 31 -	46+43	,, -	7	P.		43		This shower is always visible in July. R. 43, 119.
,,	,,	31 -	46+43	,, -	3	T.				

TABLE I.—LIST OF RADIANTS—*continued.*

Ref. No.	Date.	Radiant.	Name of Shower.	No. of ↓s.	Observer.	Aspect.	No. in G.C.	Z.A.	Notes.
69	July 30 -	31+38	β Triangulids -	4	K.	R. - -	25		R. 77 and 102.
70	,, 31 -	323+27	—	T. P.	K. P.				
71	—	—	Perseids - -	—	—		40		Scarce in July; maximum Aug. 11, but observing hindered by moonlight. Rather plentiful Aug. 15–20. *See* p. 56.
72	Aug. 11–15 -	70+64	α Camelids II. -	9	K.	R. k. - -	62		Very much like Perseids in appearance. Well known in August. R. 111.
,,	,, 15–16 -	70+64	,, -	6	P.				
73	,, 15 -	180+62	δ Ursids I.	T. P	K. P.		139		
74	,, 15 -	289+52	θ Cygnids -	T. P.	B. C.		221		
,,	,, 15 -	292+50	,, -	T. P.	B. P.				
,,	,, 15 -	290+50	,, -	3	C.	Explosive			By far the most striking shower this August, many of the meteors being bright, some hardly < ☾. In some years rich at this epoch. R. 5. *See* p. 59.
,,	,, 15–20 -	291+51	,, -	20	P.	Sl. v. br.			
,,	,, 19–23 -	291+50	,, -	11	C.	Short t.			
,,	,, 20 -	293+50	,, -	T. P.	C. F.				
75	,, 16–24 -	330+80 to 360+80	Cepheids -	22	P.	Ft. r. - -			Very rarely observed; not in G.C. Apparently a moving radiant. *See* p. 57.
76	,, 15–17 -	312+32	ζ Cygnids -	8	C.	Ft. r. - -	248		Very well seen Aug. 1879. Aug. 12–14 13↓s Weiss. Aug. 21 23 12↓s D.
77	,, 15–17 -	31+36	β Triangulids -	6	C.		25		R. 69 and 102.
78	,, 16, 17 -	289+23	β Cygnids -	6	P.	Sl. br. - -	222		Somewhat diffuse radiant. R. 59.
79	,, 16, 17 -	312+61	α Cepheids -	4	C.	Sl. - -	246		R. 15, 34 and 46.
,,	,, 17–20 -	310+61	,, -	7	P.				

80	,,	17, 18, 20	333+27	η Pegasids -	8	P.	F. sl. - -	259		
81	,,	17, 19, 20	338± 0	ζ Aquarids -	10	C.	Ft. sl. - -	260		
82	,,	17, 20 -	30+77	(50) Cassiopeids	7	P.	F. r. - -	22		Position anomalous; G.C. Decl. + 70°.
83	,,	16, 17, 19	311+14	γ Delphinids -	7	C.		243		Deserves further attention during July and August. *See* R. 49.
,,	,,	24, 25 -	312+13	,, -	5	P.				
,,	,,	25–27 -	311+15	,, -	6	C.				
84	,,	17, 18, 20	281+44	(13) Lyrids -	9	P.	Br. sl. - -	219		Very rich in 1914. Similar in appearance to the θ Cygnids.
85	,,	18–20 -	275+72	ω Draconids II.	8	P.	R. - -	213		Rather difficult to disentangle from neighbouring showers, but undoubtedly present. R. 62.
86	,,	19 -	332+52	(4) Lacertids -	T. P.	P. T.		257		
87	,,	19, 20 -	338−12	δ Aquarids -	4	C.		263		R. 61.
88	,,	19, 20 -	266+58	ξ Draconids -	6	P.	Sl. - -			There were either at least two more showers in the head of Draco active at the same time, or else one shower covering a large area of 7° or so. The determination of a radiant was therefore difficult, but this position was pretty certainly correct, covering an area of about 2°.
,,	,,	27 -	270+61	,, - -	5	P.	F. sl. - -			Good determination. Not in G.C., but undoubtedly real. Well seen July 8, 1921. 8 ↓ s, fireballs. P.
89	,,	17 -	63+29	ψ Taurids -	5	P.		54		A shower which deserves further investigation. Possibly much richer now than formerly. R. 141.
,,	,,	23–26 -	63+29	,, -	8	P.				
90	,,	15 -	42+22	ε Arietids -	T. P.	B.K., P.T.		37		R. 55, 104, 118, 133.
,,	,,	18–20 -	43+22	,, -	8	P.				
,,	,,	20 -	43+21	,, -	4	C.				
,,	,,	20 -	42+21	,, -	T. P.	C. D.				
,,	,,	23–27 -	42+21	,, -	10	P.				

TABLE I.—LIST OF RADIANTS—*continued.*

Ref. No.	Date.	Radiant.	Name of Shower.	No. of ↓s.	Observer.	Aspect.	No. in G.C.	Z.A.	Notes.
91	Aug. 20 -	29+21	α Arietids -	5	P.	V. r. - -	27		Does not agree well with the best determinations, which place the radiant at 31°+19°. R. 117, 139.
92	,, 23 -	58+12	e Taurids -	4	P.	Big ↓s br. k. -	49		The position is the same as that which supplies big fireballs early in November. Well seen Nov. 1920. R. 134, 143, 147.
93	,, 23 -	302−19	α Capricornids -	4	P.	Long. v. sl. -	237	z	R. 57.
94	,, 25, 26, 31	38+38	β Perseids -	12	P.		35		
95	,, 25, 26 -	308+36	λ Cygnids -	6	P.	V. sl. - -	244		The ↓s were characterised by abnormally long durations. Position well determined, but R.A. 5° less than in G.C.
96	,, 25–27 -	355+15	ϕ Pegasids	8	P.	Sl. - -	272		
97	,, 31 -	10+56	α Cassiopeids -	5	P.		7		Well seen 1921. Sept. 1–3, 11 ↓s. P. Sept. 1, 3, 8, 11 ↓s. C. R. 48.
98	Sept. 17 -	277½+56	(39) Draconids -	4	P.	Sl. - -	215		
99	,, 17 -	328+63	ξ Cepheids -	5	P.	Ft. r. - -	256?		
100	,, 17 -	352−10	ψ Aquarids -	5	P.	Sl. - -		z	Not in G.C. Seen by D. in 1901, Aug. 10–21 at 355°–13°. 10 ↓s.
101	,, 17, 20 -	8+13	γ Pegasids -	11	P.	Sl. br. - -	3		Conspicuous shower.
102	,, 20 -	29+34	β Triangulids -	4	C.		25		R. 69 and 77.
103	,, 20 -	102+20	ζ Geminids -	4	P.	F. r. br. k. f. long.			Meteors rather conspicuous. Shower apparently new. *See* R. 123.
104	,, 20 -	43+22	ε Arietids -	4	P.		37		R. 55, 90, 104, 118, 133. Somewhat unsatisfactory.
,,	,, 26–29 -	43+22	,, -	10	P.				
105	,, 26–29 -	91+16	Orionids I. -	9	P.		77		Well seen by P. 1921 Sept. 30–Oct. 5, 15 ↓s. It is probable that this is an early determination of the Great Orionid shower. R. 2, 120.
106	,, 27 -	82+30	ι Aurigids -	6	P.	F. sl. - -	67		G.C. R.A. is 77°.

107	„ 29 -	323+49	π Cygnids -	7	P.	V. sl. br. thick t.	(257)	z	Position well determined, rather diffuse. Probably the (4) Lacertids of the G.C. The positions there range from R.A. 323° to R.A. 341°, with suggestions of centres at 325° and 335°. The question needs investigation.
108	„ 29 -	$73\frac{1}{2}+40\frac{1}{2}$	α Aurigids -	7	P.	V. r. - -	65		R. 127.
109	Oct. 13, 14 -	253+52	μ Draconids -	5	P.	Sl. br. - -	191	z	New to October.
110	„ 13–15 -	353+ 2	ι Piscids - -	9	P.	Sl. - -	273	z	
111	„ 13–16 -	71+64	α Camelids I. -	10	P.	V. r. ft. - -	62		R. 72.
112	„ 13–14 -	133+68	σ Ursids - -	5	P.	V. r. - -	105		
113	„ 14, 15 -	359+57	β Cassiopeids -	7	P.		278		G.C. gives Decl. +60°, all recent determinations + 57°. But *see* R. 58.
114	„ 15, 16 -	6+46	π Cassiopeids -	6	P.		8		
115	„ 16 -	86+56	δ Aurigids -	6	P.	F. sl. - -	76		R.A. in G.C. = 90°.
116	„ 17 -	152+39	μ Ursids ∘ -	T. P.	D. T.		118		
117	„ 13–15 -	31+18	α Arietids -	11	P.	Sl. tr. - -	27		Prominent. Well known in October, and seen by many during 3 weeks in Oct., 1920. (*B.A.A.J.*, XXXI., No. 4.) R. 91 and 139.
„	„ 13–15 -	31+18	„ -	—	D.				
„	„ 20 -	31+19	„ -	4	P.				
„	„ 24–27 -	32+18	„ -	10	P.				
118	„ 14, 15 -	43+22	ϵ Arietids -	11	P.	Sl. tr. - -	37		R. 55, 90, 104, 133.
„	„ 18–20 -	42+21	„ -	8	P.				
„	„ 21 -	43+20	„ -	3	H.				
„	„ 23 -	43+21	„ -	7	D.				
„	„ 24 -	41+20	„ -	5	P.			z	
119	„ 17 -	47+43	α–β Perseids -	5	T.		43		R. 43, 68.

TABLE I.—LIST OF RADIANTS—*continued.*

Ref. No.	Date.	Radiant.	Name of Shower.	No. of ↓s.	Observer.	Aspect.	No. in G.C.	Z.A.	Notes.
120	Oct. 15, 16, 18, 20, 23–25	91+16	Orionids I.	42	P.		77		The observations indicate two stationary radiants. A rich return, maximum not seen in England, occurred on Oct. 21 and was well seen in America, the h. r. being over 60. *See* p. 61. R. 105.
,,	,, 20 .21	91+16	,,	7	K.				
,,	,, 21	91+16	,,	6	H.				
,,	,, 23	91+16	,,	5	D.				
121	,, 14, 15, 18 20, 24.	99+13½	Orionids II.	29	P.		79		
,,	,, 23	99+13	,,	4	K.	V. r. k.	—		
122	,, 14–23	38+12	σ Arietids	7	K.	Sl.	36		Supported by T.P. No. 34.
123	,, 17	38+10	,,	T. P.	D. T.				
,,	,, 18, 20, 24	103½+18½	ζ Geminids	13	P.		—		New, possibly a branch of the Orionids, like them in appearance.
,,	,, 23	103+18	,,	4	K.	V. r.			A shower from this region was seen also in Sept. R. 103.
124	,, 20	22+26	α Triangulids	5	P.		20		R. 51.
125	,, 18–20	23+ 4	ο Piscids	6	P.	Long. sl.	19	z	Well known in Oct. G.C. Decl. + 8°.
126	,, 18, 20	54+22½	η Taurids	6	P.		(53)		Well seen 1920 Oct. 12–23, 19 ↓s P. Included under G.C. 53, ε Taurids, but is probably a distinct shower.
127	,, 18, 20	75+40½	α Aurigids	5	P.	R.	65		Feeble. In 1920 Oct. was v. rich (P) giving 12 ↓s on 20th, and 8 ↓s on 2 other nights. R. 108.
128	,, 18	81+21	ζ Taurids	3	T.		69		Not as plentiful as in 1920. Rather like the Orionids in appearance, and liable to be confused with them.
,,	,, 18, 20	80+21	,,	9	P.				
129	,, 18, 20	118+34	β Geminids	7	P.		94		Do not diverge from a good point, but shower certainly active.
130	,, 18, 20	340+78	γ Cepheids	5	P.	Sl.	277		Only fair determination. Differs widely from previous positions. G.C. = 356° + 78°.

131	,, 24	40+85	α Urs. Min.	5	P.		52		
132	,, 24	44+ 7	α Cetids	5	P.	Sl.	38		
133	Nov. 13, 15, 18	41+19	ε Arietids	10	P.	Sl.	37	z	R. 55, 90, 104, 118.
,,	,, 15	41+19	,,	4	C.			z	
,,	,, 26	40+20	,,	4	P.			z	
134	,, 13, 15	53+14	e Taurids	11	P.	V. br. sl.	9		Well known during the first fortnight in Nov. Apparently there are several centres, and requires investigation. R. 92, 143, 147.
135	,, 13, 15, 18	148+20 to 153+20	Leonids	12	P.		115		Weather conditions unsatisfactory, but the shower appeared to be very feeble. Possibly the radiant is a moving one, but the data this year are meagre—it is not in accordance with previous determinations. *See* p. 62.
,,	,, 18	152+20	,,	3	C.				
136	,, 15	18+62	δ Cassiopeids	4	P.		1		
137	,, 15	40+29	(39) Arietids	5	P.		33		
138	,, 18	71+14	• Orionids	4	P.	V. sl.	64		
139	,, 18	31+18	α Arietids	4	P.	Sl.	27	z	R. 91, 117.
,,	,, 26	29+18	,,	4	P.			z	
140	,, 24	87+34	θ Aurigids	T. P.	Bh., Sh.		74		
141	,, 26	63+29	ψ Taurids	4	P.	Sl.	54		R. 89.
142	,, 26	167+31	ξ Ursids	6	P.		125		R. 17, 26, 146.
143	Dec. 6	56+ 8	e Taurids	T. P.	Many		49		R. 92, 134, 147.
144	,, 13	113½+31½	Geminids	11	C.	Br. v. r	88		Fairly plentiful, h. r., about 10 between 11^h and $12^h\ 45^m$. Bad weather and moonlight prevented further observations. The radiant obtained is consistent with a shifting centre. *See* p. 62.
145	,, 22	60+89	Polarids	4	C.	F. long	1		
146	,, 24	166+32	Ursids	T. P.	Bn., McC.		125		R. 17, 26, 142.
147	,, 26	57+12	e Taurids	T. P.	L. Bos.		49		R. 92, 134, 143.

Index of Radiants from Table I. in Order of R.A.

Position of Radiant. R.A.	Decl.	Name of Shower.	Reference Numbers.
4	+ 38	π Andromedids -	50.
6	+ 46	π Cassiopeids - -	114.
8	+ 13	γ Pegasids - - -	101.
9	+ 56	α Cassiopeids - -	48, 97.
12	+ 37	μ Andromedids - -	47.
18	+ 62	δ Cassiopeids - -	136.
22	+ 30	α Triangulids - -	51, 124.
23	+ 4	ο Piscids - - -	125.
23	+ 45	γ Andromedids - -	54.
30	+ 77	(50) Cassiopeids. - -	82.
31	+ 19	α Arietids - - -	91, 117, 139.
31	+ 38	β Triangulids - -	67, 77, 102.
36	+ 46	θ Perseids - - -	68.
38	+ 12	σ Arietids - - -	122.
38	+ 38	β Perseids - -	94.
40	+ 29	(39) Arietids - - -	137.
40	+ 85	α Urs. Min. - -	131.
43	+ 21	ε Arietids - - -	55, 90, 104, 118, 133.
44	+ 7	α Cetids - - -	132.
47	+ 43	α-β Perseids - - -	43, 69, 119.
51	+ 56	Perseids - - -	71.
54	+ 23	η Taurids - - -	126.
58	+ 12	e Taurids - - -	92, 134, 143, 147.
60	+ 89	Polarids - - -	145.
60	— 11	γ Eridanids - -	7.
63	+ 29	ψ Taurids - - -	89, 141.
71	+ 14	ο Orionids - - -	138.
71	+ 64	α Camelids I. - -	72, 111.
73	+ 40	α Aurigids - - -	108, 127.
80	+ 20	ζ Taurids - - -	128.
82	+ 30	ι Aurigids - - -	106.
86	+ 56	δ Aurigids - - -	115.
87	+ 34	θ Aurigids - - -	140.
90	+ 16	ν Orionids - - -	2, 105 ?
91	+ 16	Orionids I. - -	105 ?, 120.
92	+ 1	α Orionids - - -	14.
99	+ 13	Orionids II. - -	121.
103	+ 18	ζ Geminids - -	103, 123.
113	+ 31	Geminids - -	144.
118	+ 34	β Geminids - -	129.
119	+ 11	ζ Cancrids - - -	8.
131	+ 19	δ Cancrids - - -	13.
133	+ 68	σ Ursids - - -	112.
142	+ 37	(38) Lyncids - - -	35.
145	+ 27	μ Leonids - - -	9.
150	+ 20	Leonids - - -	135.
152	+ 39	μ Ursids - - -	116.
167	+ 31	ξ Ursids - - -	17, 26, 142, 146.
176	+ 12	β Leonids - - -	10
180	+ 62	δ Ursids I. - - -	73.
181	— 21	Corvids - - -	36.
190	+ 21	(35) Comids - - -	11.
192	+ 38	α Can. Ven. - -	37.
193	+ 31	β Comids - - -	23, 40.
197	— 7	θ Virginids - -	12.
200	+ 10	ο Virginids - -	16.

Position of Radiant.		Name of Shower.	Reference Numbers.
R.A.	Decl.		
208	+ 44	η Ursids	44.
210	− 13	α Virginids	38.
210	+ 50	θ Boötids	24.
213	+ 47	—	3.
216	+ 31	ρ Boötids	18.
217	− 7	μ Virginids	28.
224	+ 43	β Boötids	56.
230	− 6	β Librids	27.
230	+ 16	β Serpentids	42.
230	+ 33	θ Coronids	41.
231	+ 52	Quadrantids	1.
233	+ 27	α Coronids	20, 29.
236	− 19	λ Librids	21, 45.
241	+ 63	η Draconids	66.
248	− 25	α Scorpiids	39.
251	+ 31	ζ Herculids	30.
254	+ 37	π Herculids	4.
254	+ 52	μ Draconids	109.
269	+ 22	(97) Herculids	31.
270	+ 51	γ Draconids	22.
270	+ 61	ξ Draconids	88.
271	+ 7	(70) Ophiuchids	32.
271	+ 33	Lyrids	33.
277	+ 71	ω Draconids II.	62, 85.
277	+ 56	(39) Draconids	98.
281	+ 44	(13) Lyrids	84.
288	− 8	κ Aquilids ?	60.
288	+ 38	θ Lyrids	19.
289	+ 41	δ Cygnids	25.
290	+ 25	β Cygnids	59, 78.
291	+ 51	θ Cygnids	5, 74.
296	+ 29	—	52.
307	− 11	α Capricornids	57, 93.
308	+ 36	λ Cygnids	95.
311	+ 14	γ Delphinids	49, 83.
312	+ 32	ζ Cygnids	76.
312	+ 62	α Cepheids	15, 34, 46, 79.
323	+ 49	π Cygnids	107.
323	+ 27	—	70.
328	− 15	ι Aquarids	64.
328	+ 36	π Pegasids	63.
328	+ 63	ξ Cepheids	99.
332	+ 52	(4) Lacertids	86.
333	+ 27	η Pegasids	80.
335	+ 58	δ Cepheids	6.
338	± 0	ζ Aquarids	81.
338	− 14	δ Aquarids	61, 87.
340	+ 78	γ Cepheids	130.
341	+ 17	α Pegasids	53.
342	+ 42	ο Andromedids	65.
{330 360	+ 80	Cepheids	75.
352	− 10	ψ Aquarids	100.
353	+ 2	ι Piscids	110.
355	+ 15	φ Pegasids	96.
358	+ 60	β Cassiopeids	58, 113.

Table II.—List of True Paths.

Ref. No.	Date.	G.M.T.	Magnitude.	Radiant.	G.C. No.	Name of Shower.	Velocity Miles per second.	Notes.	Height in Miles. at Beginning.	at End.	Path in Miles	Observers.	Weight.	Computors.
1	1922 Jan. 3	h m 6 21	♃	° ° $291\frac{1}{2}+52\frac{1}{2}$	229	θ Cygnids -	19	*Cf.* T. P. 25, 27 and 33 - -	73	55	27	My. D. -	V. good -	D.
2	,, 3	6 31	♃	232+53	173	Quadrantids -	21	Splendid Quadrantid - -	72	47	84	My. D. -	Excellent -	D.
3	,, 3	6 42	> 1	335+58	264	δ Cepheids -	17	—	71	30	50	E. My. -	Satisfactory	D.
4	,, 3	10 12	1	254+37	195	π Herculids -	20	—	64	64	60	My. C. -	Satisfactory	D.
5	,, 3	10 32	1	156+32	48	μ Ursids (?) -	—	—	78	55	41	D. C. -	R. doubtful -	D.
6	,, 3	11 19	$3-2\frac{1}{2}$	210+43	164	θ Boötids -	35	—	67	58	27	K. C. -	Satisfactory	D.
7	,, 3	11 28	> 1	238+50	173	Quadrantids -	36	—	60	48	40	D. K. -	V. good -	D.
8	Feb. 7	3 55	F.	60−11	51	γ Eridanids -	14	Detonating fireball in full sunshine. Same shower as fireballs of 1921 Mar. 31 and 1921 April 10ᵈ 8ʰ 10ᵐ (accordances).	56	32	82	D. and 16 others.	Satisfactory	D.
9	,, 17	11 32	2 × ♀	119+11	95	ζ Cancrids -	10	A late member of this shower usually seen in Dec.–Jan.	56	25	45	P. K. and others.	Satisfactory	K.
10	,, 25	12 35	☽	155+13	120	α Leonids -	10	Fireball - . - - -	67	26	52	N. Pt. -	Fair - -	D.
11	Apr. 21	11 12	2 × ♃	271+32	209	Lyrids - -	30	Brilliant Lyrid - - -	84	57	46	Cn., P., C	Base line short = 12 m.	D.
12	May 21	12 35	♀	280−33	—	Sagittarids -	15	No G.C. position. Possibly an α Scorpiid and so recorded by P.	60	57	86	P. de R. -	—	D.
13	,, 23	10 34	♀	232+33	176	θ Coronids -	12	Coronid seen 1917 May 22 from 229° + 32°.	63	42	24	B. P. -	V. good -	D.
14	,, 23	10 42	3	45+45	43	α-β Perseids -	18	Perseid seen 1916 May 20 from 47° + 43°. *Cf.* T.P. 17.	71	52	64	B. P. -	Good - -	D.

15	June 12	10 44	1	237−20	—	λ Librids	18	Apparently belongs to the radiant found by P. in 1921 April.	68	52	51	P. T.	Satisfactory	D.
16	July 19	10 43	$1\frac{1}{2}$	288− 3	—	Aquilids	14	—	65	50	24	K. P.	Doubtful accordance.	K.
17	,, 19	11 52	1−3	47+43	43	α−β Perseids	26	*Cf.* T. P. 14	62	58	10	K. P.	Excellent	K.
18	,, 20	11 21	>0−2	34+53	30	θ Perseids	22	*Cf.* T. P. 19	42	37	10	K P.	Doubtful	K.
19	,, 28	12 9	>♃−>1	35+44	30	θ Perseids	36	*Cf.* T. P. 18	89	77	20	K. P.	Excellent	K.
20	,, 31	10 34	>♀−>1	23+45	23	γ Andromedids	30	—	62	43	37	K. T.	Satisfactory	K.
21	,, 31	12 45	3−2	323+27	—	—	{20 15}	—	{65 59}	55 52	{11 $9\frac{1}{2}$}	K. P.	V. good	D. K.
22	Aug. 7	10 54	>1−♀	41+56	40	Perseids	46	*Cf.* T. P. 23, 29, 30	73	50	55	B. C.	V. good	D.
23	,, 15	9 38	2−3	51+58	40	Perseids	50	Shows movement of radiant v. well. *Cf.* T. P. 22, 29, 30.	78	56	42	D. C.	Excellent	D.
24	,, 15	10 25	>♀	42+22	37	ε Arietids	31	*Cf.* T. P. No. 32	62	54	51	B., K.P., T.	Fair	K.
25	,, 15	10 27	1	292+50	229	θ Cygnids	{15 19}	*Cf.* T. P. 1, 27 and 33	{64 69}	55 55	{9 14}	B.P.	V. good	K. D.
26	,, 15	10 30	2−3	180+62	139	δ Ursids (I)	14	—	64	51	$25\frac{1}{2}$	K. P.	V. good	K.
27	,, 15	10 50	1−>♀	289+52	229	θ Cygnids	26	*Cf.* T. P. 1, 25, 33	69	43	26	B. C.	Satisfactory	D.
28	,, 15	11 40	1	47+74	45	γ Camelids	15	—	66	61	$71\frac{1}{2}$	B. P.	R. doubtful	K.
29	,, 15	12 31	>1−>♃	52+59	40	Perseids	38	*Cf.* T. P. 22, 23, 30	75	50	$34\frac{1}{2}$	K. P.	Satisfactory	K.
30	,, 17	11 10	$1\frac{1}{2}$	55+60	40	Perseids	35	*Cf.* T. P. 22, 23, 29	69	52	29	K. P.	Satisfactory	K.
31	,, 19	11 0	1−2	332+52	257	(4) Lacertids	10	—	60	54	6	P. T.	Fair	D.
32	,, 20	9 10	1−>1	42+21	37	ε Arietids	45	*Cf.* T. P. 24	64	64	40	D. C.	Excellent	D.
33	,, 20	10 56	$\frac{1}{4}$ ☽	293+50	229	θ Cygnids	—	*Cf.* T. P. 1, 25 and 27	76	41	35	F. C.	V. good	D.
34	Oct. 17	10 30	$2-1\frac{1}{2}$	38+10	36	σ Arietids	18	—	74	48	36	D. T.	V. good	D.

TABLE II.—LIST OF TRUE PATHS—*continued.*

Ref. No.	Date.	G.M.T.	Magnitude.	Radiant.	G.C. No.	Name of Shower.	Velocity Miles per second.	Notes.	Height in Miles. at Beginning.	Height in Miles. at End.	Height in Miles. Path in Miles	Observers.	Weight.	Computors.
35	Oct. 17	h m 10 46	♃	$152^\circ+39^\circ$	118	μ Ursids -	37	Apparent path v. long. Possibly connected with ☄ 1739, whose radiant on Oct. 22 = $157^\circ+39^\circ$.	71	62	224	D. T. -	V. good -	D.
36	„ 31	5 10	☽	194+33	152	β Comids -	—	Daylight fireball - - -	65	29	98	Several -	Poor - -	D.
37	Nov. 24	6 40	♀	87+34	74	θ Aurigids -	25	—	71	26	124	Bh., Sh. -	Satisfactory	D.
38	Dec. 6	11 40	> ☽	56+ 8	49	e Taurids -	20	Large fireball. Probably fell to earth.	64	2	90	Many -	Pretty good	D.
39	„ 24	8 55	2 × ♃	166+32	125	ξ Ursids -	31	—	81	55	188	Bn., McC.	Satisfactory	D.
40	„ 26	7 33	♀ − ½ ☽	57+12	49	e Taurids -	—	—	74	42	45	L., Bos. -	Satisfactory	D.
41	„ 28	6 0	☽	234+55	173	Quadrantids -	25	Seen from India, N.W. Frontier, in daylight. The accounts were picturesque, but too vague to obtain a good path.	54	29	164	Fifteen -	Not good -	D.

Names and stations of Observers in Table XVII. not given in previous list:—

E = Edgeworth, Bristol; My = Miss Myres, Oxford; N = F. T. Naish, Glamorgan; Pt = Mrs. Pollitt, Letchworth; De R. = Felix de Roy, Deurne, Antwerp; F = Miss Frampton, Bristol; Bh. = C. F. Butterworth, Manchester; Sh. = E. G. Smith, Hanwell, London, N.; Bos = Bosbury, Hereford; L. = O. H. Leech, New Barnet; McC. = McCreath, North Pemberton.

The Fireballs of 1922.

The following descriptions of the large fireballs of 1922 will be of general interest.

On February 7, at 3^h 55^m, in full sunshine, Mr. Denning, at Bristol, saw a splendid fireball while looking out of his window. The flight was carefully noted, and subsequently reduced to R.A. and Declination as follows: Beginning at $197° + 69\frac{1}{2}°$ to $210° + 60°$, the duration was estimated at $2{\cdot}0^s$. The fireball was yellow in colour, and varied in appearance as it fell. About $4\frac{1}{2}^m$ after its disappearance, a fairly distinct noise as of a remote thunder-clap, and reverberation for two or three minutes, were recorded. The fireball was seen from many places, and the noise was heard from Failand, Droitwich, Feckenham, Quinton Mere Hall, Edgbaston, Birmingham, Sherborne and places in Warwickshire. The explosion evidently occurred when about half the flight was accomplished, for the intensity of the noise was greater in the region of Quinton and Droitwich than at other places. The radiant was found to be at $60° - 11°$. On March 31 and April 10, 1921, there were fireballs from nearly the same radiant at $62° - 10°$ and $64° - 11°$. The T.P. is given as No. 8.

On February 26, at 12^h 35^m, Mr. Naish, of Glamorgan, South Wales, recorded a fireball with magnitude as $3 \times ♂$. The observed path was from $213° - 13°$ to $227° - 17\frac{1}{2}°$, and the duration of flight $= 6{\cdot}0^s$. This object was seen by Mrs. Pollitt, of Letchworth, Herts., to move slowly across her window. The colour of the meteor was vivid green, and it equalled the Moon in brightness. This splendid fireball passed from W. to E. over the coast of France, near Dieppe. *See* T.P. No. 10.

On March 5, at 16^h 45^m, a fireball was observed by Mr. Reginald Hughes, of Aldershot. It moved with swiftness and shed an intense green light. No other records of this object were reported.

On April 21, at 11^h 12^m, a magnificent Lyrid was recorded by Cn., P., and C. It was splendidly bright and the streak endured 20^s, gradually fading from each end. *See* T.P. No. 11.

On August 16, at 9^h 20^m, P. recorded a brilliant exploding θ Cygnid, magnitude = ☽, moving over a short path of $5\frac{1}{2}°$ in Ursa Minor in $2{\cdot}0^s$. It was bluish-white in colour, and had a thick orange train. C., watching in another direction, saw the reflection of this fireball, which lit up the whole sky.

On August 20, at 10^h 56^m, a splendid exploding θ Cygnid was seen by Miss Frampton at Bristol, and by C. Its magnitude was estimated as $\frac{1}{4}$ ☽. *See* T.P. No. 33.

On September 20, at 11^h 55^m, a magnificent fireball was seen by many people over Cornwall. It lit up the landscape like full moonlight. Unfortunately, the night was foggy, and only vague accounts were sent in. The duration of flight was about 5–6^s. It was not possible to obtain a true path.

On October 31, at 5^h 10^m, in daylight, a brilliant fireball was seen by many people from various places in the south of England, including Hereford, Bournemouth, Goring, Witney, and also in South Wales. Only a few bright stars were visible. It was estimated to be as bright as the Moon. *See* T.P. No. 36.

On November 16, between 9^h and 11^h, Dr. W. J. S. Lockyer, of the Norman Lockyer Observatory, photographed a fireball passing nearly over Polaris. *See M.N.R.A.S.*, Vol. LXXXIII., Plate 1, p. 92. Mr. Denning considered that the object was a Taurid. If the sky had been clear, the fireball would have been seen over South Wales. Unfortunately, it seems to have been generally cloudy and no visual observations have been sent in to the Director.

On December 6, at 11^h 40^m (approx.), a great fireball was seen off the coast of North Lincolnshire. It is probably the most brilliant fireball that has been observed in this country of late years. A son of the Rev. W. F. A. Elliston, at Armagh, though his distance from the meteor was about 290 miles, described the brilliance of the light as having overpowered the Moon, which was nearly full at the time. From Lincolnshire it was seen to pass across the sky towards the east in 2 to 5^s. In its flight it seemed to give out flames of such intensity that sea and land were lit up as with bright sunshine. A few seconds later a sound like an explosion was heard, followed by others like distant thunder. It probably fell to earth. (*See* T.P. No. 38.)

On December 28, about 6^h 0^m (Indian standard time), a large fireball was seen before sunset. We are indebted to Lieut. G. E. B. Stephenson for the 15 accounts he sent. He missed seeing the fireball, but watched the after-streak from Shagai, near the Kyber Pass, N.W. Frontier, India. The fireball was seen by many people over a very wide area, including Peshawar, Rawalpandi, Lahore, Simla, etc. It had a long flight in the neighbourhood of Lahore. The motion was fairly slow, and the fireball left a bright streak which endured 15 to 20 secs. At first this looked like a silver wand in the sky; then it assumed a serpentine, and later a zigzag, appearance. One observer thought it was the reflection of a river up in the sky. It is interesting to find that the fireball was probably an early Quadrantid. (*See* T.P. No. 41.)

In addition to the foregoing, the Director is under obligation to the following persons who have forwarded records of bright meteors observed by them. Where in such case an accordance has been found, the names appear in Table II. :—

C. Bell.	A. C. Curtis.	T. H. L. Hony.
A. N. Brown.	E. S. Dalmady.	G. H. Lepper.
A. F. Butler.	Mrs. L. Freeman.	W. M. Lindley.
J. Burditt.	M. E. Gheury de Bray.	Col. E. E. Markwick.
R. L. T. Clarkson.	W. Hall.	G. Merton.
E. W. Cooper.	W. R. Haskard.	A. A. Young.

Observations from the Southern Hemisphere, 1921-1922.

Mr. J. Warren contributed 225 paths of meteors for 1921, observed from Cape Town. Unfortunately, he could not give as much time as usual, so the radiants are not so well-determined as in other years. A list is given of some of the best positions (R. Nos. 148–175), and it is noted in Col. V., where the radiants have been previously observed.

The Director is making a collection of all Southern radiants she can find in any astronomical publications. The contributions are mainly from Mr. Warren's results, and meteoric astronomy owes him a deep debt of gratitude for his persevering work.

Mr. Alan Cousins sends 25 paths from April to July, 1922, observed from Pretoria. Johannesburg and Rustenburg. Mr. Cousins was not watching long enough on each night to obtain any good determination of radiants, though he saw some interesting meteors. Mr. O. A. Oeser, of Pretoria, contributes 32 records from July to August, 1922. He has mapped his own paths and found the radiants given in the list. They are not very close to the positions found previously, and will need confirmation.

It should be noted that, owing to scanty material, the determination of some of these Southern radiants is not of the same standard as that of the Northern ones. Also, it should be noted that no corrections for zenithal attraction have been applied in this Table.

Table III.—List of Southern Radiants.

Ref. No.	Date.	Radiant.	Observer.	Notes.
	1921.	° °		
148	Jan. 6, 10 -	72— 2	W.	G. C. No. 60.
149	Feb. 5, 12 -	174—52	W.	G. C. No. 133. *See* R. Nos. 159, 160, 164.
150	,, 8, 11 -	25—85	W.	Possibly R. Nos. 166, 170.
151	,, 8, 11 -	140—70	W.	W. Jan. 1919, r. p. 137°—69°. *See* R. 161.
152	,, 9, 11 -	220—60	W.	W. Feb. 1920, r. p. 225°—65°.
153	,, 11, 12	147—42	W.	G. C. No. 113. *See* R. 156.
154	,, 13 -	150—62	W.	
155	,, 15, 25	125—40	W.	G. C. No. 98.
156	,, 28 -	140—35	W.	G. C. No. 113. *See* R. 153.
157	Mar. 5, 9 -	85—23	W.	
158	,, 8 -	230—47	W.	
159	,, 8–16 -	174—52	W.	G. C. No. 133. *See* R. 149, 160, 164.
160	,, 17 -	175—49	W.	G. C. No. 133. *See* R. 149, 159, 164.
161	,, 28, 29	140—70	W.	*See* R. 151.
162	April 1–7 -	164—63	W.	W. March, 1920, r. p. 165°–60°.
163	May 3 -	251—61	W.	
164	,, 9, 10 -	170—56	W.	*See* R. 149, 159, 160.
165	,, 30, 31	259—72	W.	

Ref. No.	Dates.	Radiant.	Observer.	Notes.
166	June 1 -	82—80	W.	? R. 150, 170.
167	,, 1, 3 -	280—66		
168	,, 1 -	234—73		
169	,, 3 -	260—63		W. July 1917/18, r. p. 260°—65°. *See* R. 172.
170	Aug. 24, 29	50—85		? R. 150, 166.
171	,, 29, 30	345—60		*See* R. 174.
172	,, 24, 31	260—65		R. 169.
173	Sept. 21 -	40—59		
174	Oct. 23 -	350—61		R. 171.
175	Nov. 3 -	311—38		
	1922.			
176	July 4 -	225—42	O.	W. Aug. 1917/18, r. p. 232°—32°.
177	,, 8, 9 -	287—30		G. C. No. 221.
178	,, 11 -	238— 5		G. C. No. 177.
179	,, 11, 13	247—56		
180	,, 26 -	328—39		
181	,, 28, 29	288—38	Cs. -	G. C. No. 217 and Stephanides 1921 Aug. 4.

Addenda.

All times are Greenwich Mean Time.

With regard to the discussion on Stationary Radiation in the note on the Orionids, p. 61, reference should in fairness be made to a further communication by Dr. Olivier to *The Observatory*, June 1923, pp. 188-189, which was published after this Memoir was prepared.

Published October, 1923.

EXPEDITION FOR THE OBSERVATION

OF

THE TOTAL SOLAR ECLIPSE

OF

September 21, 1922,

BY THE

Members of the New South Wales Branch

OF THE

BRITISH ASTRONOMICAL ASSOCIATION.

REPORT OF THE EXPEDITION.

INTRODUCTION.

The expedition under the leadership of Mr. W. F. Gale, J.P., F.R.A.S., was in the main divided into two parties, the one stationed near Stanthorpe in Queensland, the other at The Caves, Stanthorpe, a short distance away. Both parties owed much to the kindness of the residents—the Stanthorpe party were chiefly indebted to Dr. and Mrs. Roberts, and to Mr. Rudder ; the Caves party to Mr. Denyer and his daughters, Miss Violet and Miss Dorothy Denyer. Other Members of the Branch, stationed on the slopes of Mount Marley, or at greater distances from Stanthorpe, have also contributed observations.

Unfortunately the illustrations sent with the report were for the most part in pencil, and so were not suitable for reproduction.

General Effects.

LIGHT, COLOUR AND SHADOW.

Marshall Andrew (Stanthorpe) : Before totality, the light was of a peculiar brownish colour like that seen during a bush fire, when smoke is passing in front of the Sun ; a crop of wheat became intensely green, the surrounding scenery being brownish

black; and just before totality the whole of the sky west of the Sun became purplish black. This remained so throughout totality; but in the western horizon there was a beautiful sequence of colours: due west, just above the horizon, there was a broad band of red, which, further out, became lighter, changing to a brownish red, then to a yellow, which became gradually lighter, shading off to almost white. It then changed into a pale blue, which gradually became darker. This occurred both north and south of the central red. There was not a complete absence of light.

Thomas Brindley (Stanthorpe): At $4^h\ 3^m$ the west looked as if a thunderstorm were coming, and at $4^h\ 8^m$ the shadow could be seen advancing.

J. Caulfeild (at Marley Rocks, Stanthorpe): At $4^h\ 11^m$ the sky, along the north and south horizons, was a light yellow for about 5° up—paler towards horizon; in the W. very dark bluish black. During totality was able to read a watch and the headlines of the newspaper, *The Brisbane Courier*, but not the small print. The conditions were similar to those that same evening at $6^h\ 19^m$, which was rather more than an hour after last contact.

A. R. Ford (Stanthorpe): The landscape was photographed (1) just after first contact, (2) 15 minutes before totality, (3) 5 minutes before, (4) 5 minutes after, and (5) 15 minutes after—all with same exposure on same film and same development. No. 4 darker than No. 3, but No. 5 no darker than No. 2, but perhaps a trifle lighter. In the latter case, however, the half-hour interval in the afternoon might account for the fading light. Visually there was light enough during totality to read a watch, and even the town was visible. The intensity of light seemed less than the full Moon, but the visibility was better; as there was a marked absence of shadow, it was more like the light during a dark storm. A dark black shadow began on the horizon about W. 12° or 14° N., spreading till it seemed to occupy 30° of the horizon. The sky went dark blue, but left a light yellow to orange strip along the horizon at each side of the shadow, giving a sunset effect there. The shadow approached, and could be seen reaching Stanthorpe town, making it dark, but still leaving it visible.

Henry John Gale (Broadwater, N. S. Wales): A yellow light preceded a grey sort of twilight just before totality. The colour of the sky, behind the Sun, was grey blue or silver grey; below the Sun it was golden orange, becoming pale pink towards the south.

E. Gardiner (The Caves, Stanthorpe) Could easily read a watch during totality. There was a conspicuous absence of colour in all objects, and the semi-darkness, in its weirdness, could be best described as monochrome, whose prevailing tint both near and far was an unusual thin brown. There was a distinct fringe of light round the horizon, especially marked in the south-west. In his party Miss Violet Denyer noted that

"the peculiar darkness had the appearance of a candle just lit in a dark room," and Miss Dorothy Denyer said that the "light during totality was sufficient to sketch the outline of the Corona."

H. Leck (Stanthorpe): The sky at zenith was dark, and changed through clear blue to yellow at horizon.

A. H. Little (Mt. Marley): The distant ring of hills from S.W. to N.E. was light; deep orange at S.W. Merging gradually into dark blue to black at N.E.

A. P. Mackerras: Before first contact the sky was quite clear and blue to the horizon; when the partial phase was somewhat advanced the Sun seemed to shine through thin orange smoke, the light was softened and hazy, though all the landscape was clear. Just before and during totality, the western sky was a heavy blue-black storm colour, but to N.W. and S.W. near the horizon there was a fringe of orange gold like the Sun setting through rain clouds; the line of demarkation between light and shadow was not steep as the shadow advanced. The background, ten miles distant, was seen in shadow, while the foreground was still in hazy sunlight. The freedom from shadows during totality made the eclipsed light more effective for seeing objects. The Moon appeared dead-black, and the sky all around a heavy transparent blue-black.

J. Scanlan (Stanthorpe): During the period preceding totality it was possible to distinguish the time indicated on the clock of the Post Office, distant ½ mile, to within one minute of 2nd contact.

J. Smetherst: One minute before totality the sky on the western horizon was dark, like the sky in the east in a clear atmosphere about half an hour after sunset. During totality the light seemed much greater than at full moon; this was based on the fact that only the planets and a few of the brightest stars were seen during totality; stars fainter than the 4th magnitude could be seen during full moon of October 5.

A. Stephens (Dalveen, 13 miles north of Stanthorpe): "4^h 11^m. The western horizon is black and threatening. The other three-quarters are bright." "4^h 17^m. The eastern sky is dark; the western, light. It is very cold."

Wind.

M. Andrew (Stanthorpe): "The wind quite dropped till just before totality, when there was a single gust, icy cold."

T. Brindley (Stanthorpe): "Just as shadow came, cool wind. (Eclipse cyclone)."

J. Caulfeild (Marley Rocks, Stanthorpe): At 4^h 1^m, wind slight; 4^h 3^m, wind S. to W.; 4^h 11^m, wind coming in strong gusts; 4^h 18^m, gust of wind.

Capt. H. H. Edmonds (The Caves, Stanthorpe): Shortly before the total phase, the wind was west.

A. R. Ford (Stanthorpe) : " A bit of a wind was noted at 3.45 coming from west."

H. J. Gale (C.S.R. Co.'s Sugar Mill, Broadwater, 98 miles east of Stanthorpe) : " Breeze, light south-west till about midday, then east-south-east, without appreciable change during afternoon."

H. Leck (The Caves, Stanthorpe) : " $4^h\ 0^m$, cool breeze from S.W., but only lasted a few minutes."

A. H. Little ($\frac{1}{3}$ distance up Mt. Marley's western slope, at a higher level above the observers near Stanthorpe) : 11 minutes before totality, slight wind S.W. to W.S.W. ; 9 minutes beforehand, wind seemed to drop ; 8^m, wind was gusty but seemed to steady shortly afterwards and remained so till after totality.

R. W. Schuch (Stanthorpe) : During totality, not a breath of wind.

A. Stephens (Dalveen, 13 miles N. of Stanthorpe, elevation 3,000 ft.) : " A cold cloudless day with a moderate to strong westerly wind."

Temperature.

T. Brindley (Stanthorpe) : $3^h\ 6^m$ (1st contact), temp. 20° ; $3^h\ 55^m$, 68° F. ; $4^h\ 3^m$, 65° ; $4^h\ 8^m$, 64° ; $4^h\ 10^m$, 60°.

H. J. Gale (Broadwater, N. S. Wales, about 98 miles E. of Stanthorpe) : " I had to fall back on Centigrade thermometers, standardised ; one was hanging in the sunlight, the other in the shade of a tree trunk during the afternoon."

Totality was observed at $4^h\ 12^m$ by the watch used :—

Time.	In sun. °	In shade. °	Time.	In sun. °	In shade. °
1st Contact	20·5 C.	19·5 C.	Totality (end)	—	16·2 C.
$3^h\ 26^m$	20·5	19·2	$4^h\ 26^m$	—	16·9
$3^h\ 45^m$	19·1	18·1	$4^h\ 37^m$	17·4 C.	16·9
$4^h\ 0^m$	18·1	17·4	$5^h\ 2^m$	18·4	17·4
Totality (beg.)	17·1	17·1	$5^h\ 12^m$	18·5	12·4

J. M. Fraser (The Caves, Stanthorpe) : $3^h\ 7^m$, 62° F. ; $3^h\ 40^m$, 59° ; $3^h\ 56^m$, 56° ; Totality, 54° ; $4^h\ 17^m$, 52° ; $4^h\ 25^m$, 55°.

A. Stephens (Dalveen, 13 miles N. of Stanthorpe) : $3^h\ 15^m$, 60° F. ; $3^h\ 51^m$, 58° ; $3^h\ 58^m$, 56° ; $4^h\ 0^m$, 55° ; $4^h\ 10^m$, 54° ; $4^h\ 12^m$, " It is very cold."

Dew.

J. Caulfeild (Marley Rocks, Stanthorpe) : At $4^h\ 55^m$ was shown sheet used for shadow band observation on Mt. Marley by Mr. J. McRae Fraser ; it was folded at $4^h\ 24^m$ and was still damp from dew.

Miss Violet M. Denyer (The Caves, Stanthorpe) : At $4^h\ 10^m$ slight dew on grass.

A. H. Little ($\frac{1}{3}$ up Mt. Marley) " No dew was observable on Mt. Marley, but there was probably insufficient grass."

Crescent Suns and Shadows.

Miss V. M. Denyer (The Caves, Stanthorpe): "4^h 7^m, shadows of trees black and appearing double; also sort of half moons among reflections of leaves."

Miss D. M. Denyer (The Caves, Stanthorpe): "Observed the crescent-shaped shadows amongst trees which is described as a Japanese effect."

Capt. H. H. Edmonds (The Caves, Stanthorpe): "Standing with my back to the solar crescent, I had distinctly the shadows of two pairs of ears; also when I held a pencil up against a light background, it distinctly cast four or five shadows. The top of the group was hollowed out in the form of the crescent sun; this suggested that the continuous crescent was resolved into four or five separate sections. This is mentioned because it may bear upon the shadow bands."

H. Leck (The Caves, Stanthorpe): "In the earlier portions of the eclipse, say at ·5, the shadows were blurred and showed a distinct penumbra, and at, say ·75, these penumbras separated out into separate shadows. A pencil held vertically showed four distinct shadows, the top of each shadow being a little higher than the one preceding and producing a crescent effect at the top. This applied to any small long object, such as a pencil or pocket book, etc. The crescent suns could be brilliantly produced by projecting through a hole on to the ground." But between 3^h 30^m and 3^h 57^m "no Sun's images were seen under trees," though these were "specially looked for."

Shadow Bands.

M. Andrew (Stanthorpe): "I saw no shadow bands, but some people in the town told me they could be plainly seen on the white road, and described them as being about two inches wide and about eighteen inches to two feet apart, lasting only for a few seconds."

R. H. Bulkeley (Stanthorpe): "For the purpose, a white sheet measuring 16 feet long by 10 feet wide was tightly stretched over level ground within the observing area, and oriented. The bands appeared shortly before totality and continued for about twenty seconds. They were light grey in colour, three inches in width and spaced about four inches apart. The direction was West to East, and they flowed and rippled over the observation sheet with a pronounced wavy motion and in a rapid, continuous stream. They reappeared when totality ended and continued for ten seconds; again there was the rapid waving rippling movement, with similar colour and spacing to that observed before totality, but the direction was somewhat changed. Instead of running from west to east, they appeared to come from south-west and flow north-east. Dr. Hamilton, of Melbourne, made two $\frac{1}{25}$th exposures, half plate, full aperture (no results were obtained). I am doubtful of success, owing to the

faintness, rapid wavy movement and elusiveness of the bands and yet their number and the continuous stream made them quite clear and pronounced. They were clearly visible on the surrounding rocks, tree trunks and unprepared ground."

J. Caulfeild (Marley Rocks, Stanthorpe): "4^h $12\frac{1}{2}^m$, shadow bands moving up granite rocks behind sketching party about 1 foot apart, and 2 inches wide, five to the second." "Totality over, looked away (from Sun), and then behind for bands, none at first; but at 4^h $17\frac{1}{2}^m$ shadow bands again, now about 22 inches apart and 3 inches wide and at the rate of about one per second. Phenomenon not so marked as before totality, and lasted a shorter time. As far as could be judged on the rocks the direction was from W. to E.—a little to N. perhaps—both before and after totality."

Percy J. Drain (Wallangarra, N. S. Wales): Eight exposures were made with two cameras: (*a*) vest pocket Kodak, anastigmat. lens, F. 8. roll film, speed 290, exposure $\frac{1}{25}$th second, Kodak filter; (*b*) postcard focussing camera, aplanatic lens, F. 8, film pack, exposure $\frac{1}{25}$th sec., Kodak filter, but, despite clearing and intensification process, no shadow bands were recorded. Judging by the density of the negatives the chemical intensity of the light 15 seconds after the bands commenced was only about $\frac{1}{5}$th of what it was at 10 seconds after commencement.

To the eye, the shadow bands were distinctly visible, and occurred in the following order:—

(1) A shade appeared on the lower right hand corner of the sheet, a few seconds after some very narrow bands, about $\frac{1}{4}$ inch wide and approximately 2 inches pitch, appeared over a small area on the extreme lower right hand corner. They appeared to "shimmer." (This was about 4^h 11^m 45^s approximate civil time. The Corona appeared at about 4^h 12^m 58^s.)

(2) A few very distorted bands. The general direction of travel of those observed was something like 10 degrees from the vertical to the right.

(3) The bands were straightened out and covered higher on the sheet; they appeared to have a darker leading than trailing edge, and to be about $\frac{3}{4}$ inch wide and $1\frac{1}{2}$ boards pitch (say 8 inches). The bands were judged as passing an observed point at about 300 per minute. All shadows went fainter.

(4) The bands were either farther apart, or slower in speed, with what appeared like a caterpillar motion from left to right.

"At this stage I looked on the ground at the right, and there the bands appeared to be moving slower—about 6 ft. pitch and 8 inches wide; the contrast of light and shade was much more marked than on the sheet; where the bands were passing over a macadam road they were most distinct. Looking back on to the screen, the bands had not altered from the previous observation."

"I am positive of observing (1) a shade on the screen; (2) very fine and fast moving, or close pitched (one or other) bands; (3) distorted bands; (4) straight bands of much greater

pitch than the first narrow bands. I am fairly certain of the number per minute, for as the bands passed a prominent crease in the sheet they produced a flickering, making a vivid impression on the memory. I am not positive of the pitch of the bands, as that was difficult to judge, also the caterpillar motion, and the darker leading edge may have been an optical illusion due to some slight creases in the sheet."

From the photographic experiments it is deduced that "the probable velocity of the bands is 40 inches per second and width $\frac{3}{4}$ inch; and that the band travels its own width in $\frac{1}{53}$rd sec. —allowing half a band movement, the maximum exposure is $\frac{1}{108}$th sec. due to movement."

It is suggested that a mounted sextant in conjunction with a screen suggests itself as a means of determining accurately the pitch of the bands, by manipulating the instrument until the bands are passing unbroken, and repeating at three angles. For sight-seeing it is suggested that a slightly reddish grey sheet about 20 feet square, and stretched horizontally, would prove the most effective, the observer being stationed at such a height that the shadow of his head falls upon the screen about 40 feet distant.

Capt. H. H. Edmonds (The Caves, Stanthorpe): "Shortly before the total phase the shadow bands were well observed by all the party (at the Caves); the parallel bands moved in the same direction as the wind (which was a west wind), and at about the same velocity, their direction being at right angles to the wind. I should estimate that the bands and spaces measured about nine inches across."

A. R. Ford (Stanthorpe): The shadow bands were observed on a slightly sloping light-coloured rock, sloping towards the west. They appeared as flickering, ripple-like shadows about $1\frac{1}{2}$ inches wide and 8 inches apart. The speed was roughly estimated as about 15 miles per hour. They were travelling East or East by North. The slope of the rock was 15° from the horizontal, and the direction of the band was north and south. The bands were not looked for after totality.

J. M. Fraser (The Caves, Stanthorpe) noted that the shadow bands travelled N.N.E. in direction during a period of 45 seconds. These bands were $4\frac{1}{2}$ inches wide and 16 inches between bands

Mr. J. H. Gale (Broadwater, N. S. Wales, 98 miles east of Stanthorpe, Queensland): "Shadow bands:—My two observers unfortunately disagree, having seen the bands under somewhat different circumstances. (*a*) The official appointed was stationed at a high point in the mill, so as to watch the expanse of roof below. Before totality, he saw the bands, very faint, about 1 foot to 18 inches wide, about 15 feet apart, travelling east at (as nearly as he could judge) 20 miles per hour. This was during the last of the yellow light, which preceded the grey sort of twilight just before totality. During totality, nothing in the way of shadow was seen by anyone. After totality, as the grey brightened to yellow, he saw them again, 50 *per cent. more*

distinctly, about 1 foot wide, 2–3 feet apart, still travelling eastward, as nearly as could be judged, at perhaps 30 miles per hour.

"(*b*) An unofficial observer saw the bands, before totality only, on the fences. They seemed to him like rippling fingers on a keyboard, travelling (though distorted by the angle of the fences) east, at, he considers, 4 miles per hour. This observer has since shown me, in the mill, what, he says, is a very similar appearance when light rays through holes on the roof impinge on the floor, having traversed steamy air.

"I have seen in the papers the story about the bands showing *during totality*, which is entirely at variance with any observations here. Neither (*a*) nor (*b*) detected any change in direction of movement."

J. C. Jenkinson (The Caves, Stanthorpe): Shadow bands were seen on a white sheet, and were estimated to be from 1½ inches to 3 or 4 inches wide. Twenty-four of them passed in 10 seconds, travelling at the rate of 8 or 10 miles per hour. Just before totality they travelled from N.W. to S.E.; after totality, from S.W. to N.E.

Dr. Maurice Hamilton (? Stanthorpe): "I obtained no result from attempt at photographing the shadow bands . . . with a Voigtlander 6½ inch equiv. focus, working at f. 5·4, full aperture, namely 1½-inch D.R.P. collinear. . Mr. Merfield, President of the A. S. Vic., told me that his son at Goondiwindi had successfully photographed, or rather cinematographed, these bands by means of a knife-edge arrangement. What that contrivance may mean I am at a loss to know. I understand it will be screened publicly to-night, and if I see any positive result I will send a line to you (Mr. Gale). But if nothing happens on the screen, I will not wire." (Mr. Gale received no wire.)

H. Leck (The Caves, Stanthorpe): "$4^h\ 10^m$. Faint shadow bands seen by Mr. Campbell on side of white house. Mr. Campbell was situated square opposite the side of the house, and the bands at this time were not seen by me, stationed at an angle of about 45° from the side. Others who were square opposite the wall also perceived them at this time. $4^h\ 11^m$, shadow bands were now seen by myself. They were very conspicuous and dark, about 3 inches wide and 9–12 inches apart. They appeared to be, generally, parallel to meridian, and showed up very distinctly on grass, dark rocks and the white house. The darkest bands seen by myself were visible for about 4 to 6 seconds. while the fainter ones observed by others had a duration of about ¾ of a minute, and travelled east at a velocity of 6 to 8 miles per hour, the greater velocity taking place at the termination" . . . After totality the "shadow bands appeared with the same intensity, velocity and direction, but in inverse order."

A. H. Little (Mt. Marley's western slope about 1½ miles above the Stanthorpe Observing Station): "Shadow bands seemed on Mt. Marley to last a few seconds only (say 5), and seemed

immediately to precede totality. I *know* they were not visible on the sheet 25 seconds before totality, though a hazy effect as of very small spots or points of light seemed floating in the air at a distance of 50 to 100 yards, about one and a half or two minutes before. I estimate the width at 1 to $1\frac{1}{2}$ inches, and about 12–15 inches apart, and they travelled from slightly N. of W. to slightly S. of E., *certainly not* in the direction of the wind. My estimate of direction may be slightly out, but very slightly—they may have travelled from due W. At a distance away of 2 miles due W. observers commented on the 'earth rocking,' and the opinion was expressed that the bands were certainly larger than those I saw."

J. Smetherst (Stanthorpe): "Both at the beginning and at the end of totality I saw the shadow bands plainly on the light brown rocks behind our sketching table. The bands appeared to be very few inches in width, continuously flickering, and very close together: I should say considerably less than a foot apart."

A. Stephens (Dalveen, 13 miles north of Stanthorpe, elevation about 3,000 ft.): 4^{h}. 0^{m}. Mrs. Stephens reported a flickering shadow hovering for a few seconds (less than five) over distant trees. She was looking west, the trees being directly under the Sun. We watched for some minutes, but the phenomenon was not repeated. 4^{h} 11^{m}. The shadow bands were observed again, this time on the ground round our feet: they were faint at first, but as the sunlight failed they became more distinct and persisted up to the moment of totality. To me they resembled most the curving ribs left by the sea in the sand when the tide goes out, but they were rather wider apart and in rapid flowing motion over the ground. General direction, W. to E. Rate of motion, as quick as one might run. They flitted under the fruit trees as the shadow of a bird might when flying above. The orchard soil is fine grey sand. 4^{h} 16^{m} 20^{s}. Totality was over. For a few seconds we were bathed in a crimson flickering light, and the shadow bands raced over the ground again in the same general direction, but this time the bands were red and black, and the contrast between the shadow band and the light band much greater than before, so great as to give the flickering effect already mentioned. But the red light and the bands rapidly failed, and in less than 10 seconds from the instant totality was over they were completely gone.

Baily's Beads.

R. H. Bulkeley (Stanthorpe): A careful watch was kept for Baily's Beads, both with the naked eye and with a pair of Ross binoculars, plus 6, but without success.

E. Gardiner (The Caves, Stanthorpe): No observers in the party at The Caves report having seen Baily's Beads.

A. H. Little (Mt. Marley's western slope): Baily's Beads were not seen in the glass at the passing of the total phase.

Stars and Planets.

T. Brindley: Jupiter, Saturn, Venus, Mercury, Arcturus, Spica.

J. Caulfeild: Mars, Venus, Mercury and Jupiter, and α and β Centauri.

Miss V. M. Denyer: Mercury, Venus, Jupiter.

Capt. H. H. Edwards: "Prior to eclipse I had decided in what order to look for planets and stars, so was enabled quickly to glance at them, and saw all that I had decided to look for. They included all the five planets and stars up to, but not including 4th magnitude. Thought I saw β Virginis, but had no time to make certain."

A. R. Ford: Venus, Jupiter, Mercury, Saturn, Spica.

J. H. Gale: "Planets and stars seen. Once they started to appear I fancy the speed was too great for the observer. A great many more showed out, both round the Sun and in the eastern sky, than are recorded here. The order of appearance, so far as I can place them, from his map, on which I had marked out guiding posts, was:—Venus, Jupiter, Mercury, Saturn, Arcturus (probably), α and β Centauri, two stars in the Southern Cross, and then numerous others unplaced.

E. Gardiner: Jupiter, Venus, Mercury and several stars in Crux and Centaurus.

H. Leck: Planets and many stars were visible and brilliant. No time for identification.

A. H. Little: Four stars of S. Cross plainly seen, but the 5th (ϵ) not visible to the near mid-totality. Jupiter seen for 15 minutes after totality. Not able to see β Virginis with the naked eye on account of the brightness of the Corona.

J. Scanlan: Venus, Jupiter, Mercury, Saturn, Mars, Spica, α and β Centauris, Corvus, 5 stars in the Cross, Arcturus, α Coronæ, and Vega.

A. Stephens: During totality we counted 12 to 18 stars.

The Corona and the Chromosphere or Prominences.

Messrs. M. Andrew, A. R. Ford, H. Leck, A. H. Little, A. P. Mackerras, J. Smetherst and *Miss V.* and *Miss D. Denyer*, all estimated the greatest length of the coronal streamer in the S.W. as being from $1\frac{1}{2}$ to 2 solar diameters or over. This is by no means an extravagant extension for a coronal ray to be detected by the naked eye, and it should be noted that the greater extensions were observed by those who had shaded their eyes during the partial phase.

Messrs. M. Andrew, H. Leck, A. P. Mackerras and J. Scanlon gave impressions of the light of the earth-lit moon. *Mr. Andrews* saw it as "inky black"; *Mr. Leck*, as "dead or dull black and in size very much smaller than either the sun or full moon"; *Mr. Mackerras* said, "The moon appeared dead black and the

sky all around a heavy, transparent blue black. The jet blackness of the moon was impressive and also the silvery corona on the dark sky." *Mr. Scanlan*, however, found that "a faint illumination on the moon's limb imparted a noticeable rotundity to the lunar disc, which was of intense blackness in the centre." Of the colour of the corona itself, *M. Andrew* says: "I would describe the colour as yellow near the sun, and yellowish white further out, becoming lighter still, almost to white, at the end of the longest streamer, which was about two diameters of the moon in length." *T. Brindley* says: "Colour pearly white. Just before end a deep (lobster) red blotch on S.W. limb." *A. R. Ford*: "Just before third contact, the corona was observed through the theodolite after a photograph had been taken. The corona appeared reddish coloured, with uneven surface, and looked most beautiful. Then a bright spot of dazzling light, tinged with red, shone out for about two seconds, and then the sun appeared." *E. Gardiner:* "The delicate colouring, so illusive to portray and as difficult to describe, impressed us by its silvery pearl-like softness, so unlike anything terrestrial, that comparisons are inadequate to assist us." "Several members, including myself, saw with certainty the pink, red chromospheric projection like a huge prominence, but much less defined, its outline being soft and woolly." . . . . . "The two prominent western extensions, which seem to have held the attention of observers the most, are portrayed with great similarity, all agreeing in drawing them to the extent of $1\frac{1}{2}$ to 2 seconds' diameters, the southern arc slightly the longer. Mr. Scanlan shows it reaching out to a little more than two diameters. It was between these two western streamers that the prominent pink projection was seen." *H. Leck :* "The colour of the corona was yellowish." *A. H. Little :* "No prominences visible to the naked eye—none seen in glance round the limb of the sun during mid-totality with 3-inch Broadhurst Clarkson 80+. But I was particularly pleased with my glimpse of the passing of totality through the glass. Several pink coloured projections were easily discernable *just* before totality ceased, for a few seconds on the western edge." *A. P. Mackerras :* "The delicacy and gradations of tone in the streamers was marvellous: the bright inner corona gently merged into the fainter streamers and then gently merged into invisibility at their ends and to their sides. The colour was a shining silver with just a tinge of cream." *J. Scanlan :* "Prior to end of totality a beautiful fire-red flash was observed beneath lasting only 3 seconds." *A. Stephens :* "No prominences are visible to the naked eye till the moment before totality is over, when red flames are visible on the western limb. . . . . Totality is over . . . . for a few seconds we are bathed in a crimson, flickering light . . . . and the shadow bands . . . . are red and black . . . . But the red light and the bands rapidly fade and in less than 10 seconds from the instant that totality was over they are completely gone."

This repeated observation of the "fire-red flash" (to quote only one description) by so many watchers, scattered widely apart, is of more than pictorial interest. For evidently here we have the means of interpreting from these naked-eye observations of the chromosphere, other naked-eye observations made long ago. In the *Journal* for May, 1923 (Vol. **33**, p. 285), M. Daniel Sviatsky gives extracts from the astronomical phenomena described in Russian chronicles, and "The Eclipse on May 1, 1185, is described in great detail : 'In the evening there was an eclipse of the Sun. It was getting very gloomy and stars were seen and in the men's eyes was a green light. The Sun became similar in appearance to the Moon and from its horns came out somewhat like live embers.'" "'Live embers' is evidently a great prominence, observed before the total phase. In such a case it would be the most ancient record of prominences," is M. Sviatsky's comment. But "live embers" is a description very comparable with *Mr. Brindley's* "deep (lobster) red blotch" or *Mr. Scanlan's* "fire-red flash," or *Mr. Ford's* "bright spot of dazzling light tinged with red," which all seem to point to sunlight being coloured red by the chromosphere.

Of the light during totality, there are two "bracketing" observations by *Mr. A. R. Ford* ("The intensity of light seemed less than the full moon, but the visibility was better and there was a marked absence of shadow") and by *Mr. Smetherst* ("During totality the light seemed much greater than at full moon. This was based on the fact that only the planets and a few of the brightest stars were seen during totality, stars less than the 4th magnitude could be seen during full moon of October 5th.").

There is a very great difference between the numbers of stars and planets visible in this eclipse—up to 18 or more—and those observed in the annular eclipse of April, 1921—at the very most 6.

The foregoing has been compiled from the various notes by observers. The Report written by Miss Miriam Chisholm is given *in extenso*, as it is already drawn up in the form of a report.

Total Solar Eclipse of September 21st, 1922,

As seen by MIRIAM S. CHISHOLM and F. J. TINDAL.

Our party was quite an amateur one and our aims were as follows :—*To observe* :—(1) The contacts.—(2) The passage of the Moon over any sunspots.—(3) The shadow bands.—(4) The corona (and make at least two independent drawings thereof, not to be compared until after).—(5) The prominences.—(6) Baily's Beads (photograph).—(7) Effect on animal life.—(8) General colouring of landscape and sky, stars and planets visible during totality, anything unusual, striking or unexpected.

To photograph :—(1) The partial phases.—(2) The total phase.—(3) The shadow bands (if it seemed possible).

This seemed a very large order, but as we all knew that it would probably be the only total Solar eclipse we would ever see we had made up our minds to see it all. This was more easy owing to the long duration of totality and the programme was arranged in such a way as to enable, as far as could be expected, each person to do the work of the other, but at a different time. We thus hoped to collaborate our evidence, as it were, strengthen our opinions and be sure of what we saw. It turned out much better than we had dared to hope or expect, and our combined notes may contain something of interest to others.

We motored the six hundred miles from Sydney, but, owing to bad weather, we were delayed four days at the early stages of the trip. Consequently, we were unable to reach Goondiwindi, on the N. S. Wales border, from where we had hoped to make our observations, and were still some fourteen miles east of the town half an hour before the eclipse was timed to commence. We pulled up in the shade of a tall gum tree and in a place where there was a clear stretch of road and low trees on either side. There was little time to lose and our cameras, telescopes, etc., were very quickly unpacked and ready for mounting on their various stands. We had no idea of the exact time, so were ready for first contact early, so that we might set our watches to within a minute, at least !

The instruments were very modest ones, though they proved sufficient for our uses. They were as follows :—*Equipment.*—3-inch telescope, focal length of 36 inches, mounted on firm tripod; 1-inch telescope, focal length of 15 inches, mounted on stand and resting on wind-screen of car; two cameras (hand), focal length 5 inches, aperture about 1 inch; "Boy Proof" watch !; stop watch to measure to $\frac{1}{5}$ of a second; sheet for observing shadow bands; chalk and blue paper for drawings of the corona; map containing positions of stars and planets expected to be visible during totality.

As the time drew near for first contact I watched eagerly through the 3-in. telescope for the first flattening of the solar limb. At the first sign I set going the stop watch and from it set the "Boy Proof" watch to show $3^h\ 7^m$ at the instant of first contact. The stop watch was then made ready to record the disappearance of a spot visible on the solar disc. *Sunspot's appearance* as compared with the black lunar disc was brownish, and about half as dark in colouring. The atmosphere was rather unsteady and as the Moon almost touched the spot it seemed lighter and rather pinkish. The spot did not disappear instantly as a star does when occulted. It faded slowly. It became invisible at $17^m\ 10^s$ after first contact.

The light now began to seem different, crescent suns were reflected through the leaves of trees, and the vegetation became gradually colourless and the sky a deep blue. Venus was very plain, but we had seen her before the eclipse commenced when she was close to the zenith.

Effect on Animals.—The first time that the eclipse was seen to affect the animals was about half an hour before *first* contact! When we began to unload the telescopes, etc., from the car we were surrounded by a mob of cattle, which suddenly came from the bush near at hand. They were intensely interested in the arrangements and at one time I thought they might charge the whole outfit. But they disappeared almost silently and were not seen until after everything was over. About ten minutes before second contact the swallows and martins became aware that "something was going to happen." They swept in excited circles above our heads, uttering startled cries and making very much more noise than when they go to roost in the evening. During totality there was absolute silence from all animals (except the human element and even we were conscious of a strong desire to speak in whispers).

The wind, which had blown strongly all day from a westerly direction, died down, and only came in fitful gusts which seemed to descend from nowhere and, after scattering our papers and drawing materials in various directions, disappeared as mysteriously as it had come, leaving no trace of swaying trees to mark its passage. It simply "swooped" and was gone.

The Shadow Bands.—For observing these we had spread a sheet stretched firmly and held down by weights. We had no compass, but used the position of the Sun to guide us. It position was guessed to be a little north of west, so our compass points are very approximate. About 5 min. before totality I saw a very faint shadow cross the sheet, it was too ill defined to be quite sure; but 2 min. later we all saw them. They appeared to me to be at first about $1\frac{1}{2}$ inches broad and perhaps 10 inches long. At first the distances from crest to crest were irregular and quite impossible to measure. They became much more distinct and measureable about 3 min. before second contact, and were travelling from about 8 to 10 miles an hour, and their direction was from the west-south-west. I scraped a mark in the ground alongside the sheet to show direction, and then stood by the telescope to watch for totality. After third contact the bands were very large, broad and distinct, and had changed their direction and were moving from the south-west at about the same pace as before. Mr. Chisholm saw them 30 yards away, and his estimate of their proportions is given below, together with Miss Tindal's and mine. We saw them together and our estimates coincide fairly nearly:—

Mr. Chisholm (after)	*Miss Tindal*	*Miss Chisholm* (before)	After.
Width, 3 ft.	$1\frac{1}{2}$ inches	$1\frac{1}{2}$ inches–$2\frac{1}{2}$ inches	4–6 inches
Tip to Tip, 12–14 ft.	—	12 inches–18 inches	4 ft.
Crest to Crest, 10 ft.	6–10–12 inches	18 inches	3 ft.

The bands were curved slightly and were compared by Miss Tindal to wind ripples over wheat. They reminded me of the shadows cast by smoke from a tall chimney. My impression is that it was quite easy to follow the course of one "band" from the time it touched the sheet until it had raced across

the intervening ground (some 10 yds.) to be lost in the shadow of a near-by tree.

Baily's Beads.—About 1 minute before totality Mr. Chisholm and I took up our positions for observing Baily's Beads and photographing them. He stood by the camera, a quarter plate 4 + 5 Century, working at f. 128 and instantaneous exposure, ready to snap when I, watching through the telescope, gave the word "Now." The Beads looked like lines which appeared to jump across from the encroaching Moon to the edge of the crescent Sun. They changed rapidly and appeared all along the fine bright line of the Sun, reminding me of an irregular line of black keys on a piano key-board. At one time they were quite invisible and then there was a sort of "outburst" of them on either side of the crescent. All this happened a few seconds before totality, but how many, I could not say. In my notes I have estimated their first appearance at 5 seconds before, but on consideration it seemed too short. The Beads were not especially looked for after totality. Mr. Chisholm was at the 3-in. telescope looking at prominences at the time of second contact, and did not notice them.

Programme for Totality.—Mr. Chisholm had consented to have his time divided up as follows :—The first minute to make a sketch of the corona; the second, to take a photograph; the third, to make notes on any prominences visible in the 3-in. telescope.

Miss Tindal had a specially prepared chart on which she was to mark off the stars visible and the rest of the time was to be used to note anything unusual.

My own time was :—The first minute notice any prominences; the second, help to identify stars visible; the third, make a sketch of the corona.

Also, with the stop watch, to note the duration of totality.

Totality.—The above programme was carried out in full by Mr. Chisholm, who made two sketches of the corona, took the photograph, and marked in the positions and peculiarities of the prominences on a prepared circle

The Prominences.—There were four or five quite distinct, one of them detached, and of a peculiar pinkish colour. They extended, using the clock dial method, from 8 to 5 o'clock and the detached one was at 7, in an inverting telescope. They were not visible to me with the naked eye, though I must admit that I only concentrated specially for a few seconds as I was busy sketching the corona at the time they became visible, some 20 seconds before third contact.

Miss Tindal carried out her part of the programme excellently, and a list of the stars identified is given below :—

Stars Visible.—Four stars in the Southern Cross; The Pointers (α and β Centauri); Antares and several other stars in the Scorpion; Vega; Arcturus; Spica (and two stars unidentified between the zenith and the eastern horizon, about half way up). Corvus not seen.

Planets Visible.—Mercury; Jupiter; Saturn; Venus (seen before first contact); Mars? (not sure).

The Corona.—My part of the programme was, I am afraid, not strictly adhered to. I looked up from the telescope just an instant before totality and thought I saw the Corona, a pale fringe round the Sun but more pronounced on the south-western side. I ejaculated, "The Corona," and then the light went out and we saw it in all its glory. I went back to the telescope for about 10 seconds, but as there was very little to see and the naked eye view was so glorious I spent my time gazing. I had started the stop watch a little late, as, in the excitement, I found I still had the "Boy Proof" watch in my hand and it took a few seconds to pick up the other. During the first 70 seconds I also helped identify some stars and planets and then took Mr. Chisholm's place at the table and drew what I could see of the Corona. The streamer on the south-western side was, to me, the longest of the four visible. It was also brighter than the others and, although my sketch does not show it, it seemed to be broader near the Sun, ending fairly abruptly, except on the south side, which continued in a bright streaming and rapier-like shaft toward the west, where it ended in a diffused light about one and a half diameters away from the black lunar disc. On the south side the light was feathery, more so than on the north (The Polar regions?) The long streamer on the north-east seemed bent more than expected. In fact none of the streamers seemed to radiate exactly from the centre of the disc, as drawings of other eclipses indicate. The light from the Corona did not end abruptly. It seemed to melt into the sky and it was very difficult to show its limits, they were so indefinite. The colour of the streamers was pearly white or soft white.

The Sketches.—We had no "plumb line" to guide us, nor did we divide the circles into four as is usual. The drawings are untouched since they were made during the actual phenomena. Mr. Chisholm's shows a broader outline than mine and his north-eastern streamer makes a bigger angle with the equator. The breadth of outline seems to me to be accounted for by the fact that he was taking a photograph up till actual totality, and not watching the Sun; whilst I was at the telescope and, for the last few seconds, did not use a dark glass, as far as I can remember; also I had been using the telescope more than he had. The prominences were put into Mr. Chisholm's sketch out of proportion to the size of the sketch, but as they appeared in the 3-in. telescope using a power of about 40. I glanced up for perhaps 10 seconds, and searched the limb of the Sun when I was told prominences were visible in the telescope, but saw nothing with the naked eye, so they do not appear in my sketch, which, I am afraid, is rather rough and unfinished.

The End of Totality.—The light returned suddenly as if a searchlight was turned upon us. Brilliant white as is Venus in her greatest glory and then daylight returned with a rush; the corona melted away, birds began to fly about, the cattle

we had seen earlier in the day came out from their shelter, and the shadow bands swept by, vanishing suddenly. It left one with a question as to whether those three minutes were but a vivid dream. The length of the total phase by the stop watch showed $3^{m}\ 15\frac{3}{5}^{s}$.

Third to Fourth Contacts.—There only remained to observe last contact and the re-appearance of the spot. I was busy collecting and making notes and the spot reappeared before I was ready for it, but I observed fourth contact at $5^{h}\ 15^{m}\ 33^{s}$, making the time of the whole eclipse to have taken $2^{h}\ 8^{m}\ 33^{s}$ by the "Boy Proof" watch, which gains considerably and is not constant!

MISCELLANEOUS.

Colouring.—The effect of the rapidly diminishing sunlight on the surrounding landscape was weird and uncanny. The open trees and glorious blue sky gradually became neutral tinted and lifeless; then, as the light faded yet more, an ashen hue covered everything; all nature died and the grey light became her winding sheet. The sky during totality was remarkable. The centre of interest was, of course, the eclipsed Sun, the Moon being a black ball in the centre of a pearly radiance, bright yet soft! The streamers seemed to melt into the illuminated sky surrounding them. The sky itself deepened in colour until it reached, some distance away, a deep lifeless steel blue. On the northern and southern horizons and continuing, perhaps, ten degrees toward the zenith the sky was primrose or yellow, fading or rather, deepening, into green and from that colour to the deep blue before described. Yet all these colours which suggest life and beauty were without *life*, almost ashen if one can picture an ashen yellow. The Moon looked black at first, yet later seemed that deep, deep brown which one sees in the centre of a Catherine wheel, which to me does not look dark enough to be called "black."

Chromosphere.—The chromosphere was not seen for certain, but at one time, during or just after the time I was paying particular attention to Baily's Beads, I noticed an orange or pinkish rim to the Sun, more especially on the right hand, lower side (inverting telescope). At the time, I put this colouring down to the telescope itself, but on hearing others describe it, and the time they saw it, I am inclined to think that I, too, noticed the chromosphere.

Shadows.—The Sun was not directly overhead, as the eclipse commenced at $3^{h}\ 7^{m}$. Consequently, the crescent suns which appear under tall trees were rather elongated and out of proportion. At $3^{h}\ 55^{m}$ we noticed that all shadows, including our own, had a double outline, giving the appearance that a photographic plate has when it has been moved during exposure. The shadows were dark and well defined on their "principal" outline, the second outline was blurred and much fainter.

During totality I remember seeing no shadows thrown by the light of the Corona. I am almost sure that, though the light was brighter than a Full Moon considerably, there were no definite and marked shadows under the trees, etc. It was darker under trees, but the shadows, as far as I remember, were more like that thrown on a dull day. Perhaps other observers noticed this?

Lunar Cusps were noticed about 5–10 min. before totality (roughly) to be blunted considerably. This may have been due to atmospheric disturbance.

PHOTOGRAPHS.

I took a series of snapshots—using f. 45, $\frac{1}{100}$th sec., and a speed film 250 H & D—of the partial phase, all on the one negative, at intervals of 9^m, 15^m, 5^m, 6^m, 9^m, the irregularity caused by the fact that I had so many things to prepare that I generally forgot until minutes after. I had intended these pictures to be taken at 5^m intervals. I took no photographs of the phase after totality.

Baily's Beads were also attempted; the exposure is mentioned elsewhere. Plate speed was about 220 H & D., but I purposely used an *old* plate, as it should be slower. It was unbacked.

Corona and Eclipsed Sun.—Exposure :—F. 8, 1^s. Backed, colour sensitive plate, speed 500 H & D.

Temperature.—At first contact, 68° F.; totality, 60° F.; last contact, 60° F.

GENERAL APPEARANCE OF LANDSCAPE AND SKY.

After a certain time during the oncoming of totality, the sky below the Sun, toward the West, gradually changed from light blue, through all the darker shades, to what must be described as a translucent black, for want of a better term, because as all trace of blue faded from the sky, yet there was blackness, into which the eye seemed to punctuate during the few minutes immediately preceding totality. During totality, from our position close to the centre of the eclipse belt, a wide band of pale blue light, shading to orange on its upper edge, was visible on either horizon. This band, indicating the limits of the region of totality, extended towards the zenith for about 10 degrees before fading out.—M. S. CHISHOLM, *per* F. K. C.

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